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A review on medicinal plants with supposed biological activities for the endogenous management of the COVID-19 pandemic in Benin, Togo, Ghana, Burkina-Faso and Cape Verde

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Abstract

The rapid emergence of the coronavirus infection worldwide since December 2019 (Covid-19) has incited the search for therapeutic solutions following different approaches. The use of natural remedies is an alternative solution to strengthen immunity and fight and prevent Covid-19. This study aimed to review the medicinal plants used against Covid-19 infection or the symptoms of Covid-19 in Benin, Togo, Ghana, Burkina Faso and Cape Verde. Data were collected from databases such as PubMed, Google Scholar, Science Direct and Scopus. In total, 152 medicinal plants belonging to 53 botanical families were identified. The most represented families were Leguminosae, Rubiaceae, Apocynaceae, Combretaceae and Compositae. Fever, cough, fatigue, stomach ache, sore throat and headache are the main symptoms of Covid-19 treated by these plants. Leaves, roots, bark and fruits are the most used plant organs. Scientific validation of some medicinal plants recorded demonstrated their antiviral, anti-inflammatory, antioxidant and anti-malarial properties, thus justifying their use in the management of Covid-19. In this review, we provide scientific literature highlighting the significant contribution of ethnobotany and pharmacology to the management of Covid-19. In addition, future studies can be conducted on these plants to gain more scientific data on their pharmacological activities and to accelerate the development of traditional medicine for the treatment of Covid-19.

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Introduction

Since its first appearance in Wuhan, China, in December 2019, the coronavirus infection (COVID-19) has been a global pandemic that has taken the world by storm (Wang *et al.*, 2020; Hu *et al.*, 2021). This unprecedented health crisis has been responsible for hundreds of millions of deaths worldwide in the last two years (Sharma *et al.*, 2020). On January 30, 2020, WHO declared the new coronavirus (SARS-CoV2) as the sixth public health emergency of international concern (Eurosurverillance editorial team 2020) before declaring it a pandemic situation on March 11, 2020 (WHO 2020). As of April 27, 2021, the virus has infected more than 147.5 million people worldwide and the number of deaths is estimated at over 3.1 million (WHO 2021a). Similarly, it was reported in Africa, more than 4562512 confirmed cases representing 3.05% of the confirmed cases worldwide and 121111 deaths (Health, Pharma and Medtech 2021). In West Africa, Ghana (924614 positive cases including 779 deaths), Cape Verde (25 159 cases, 229 deaths), Burkina Faso (13263 confirmed cases including 156 deaths), Togo (12884 confirmed cases and 122 deaths) and Benin (7720 confirmed cases including 41 deaths) are among the most infected countries as of April 2021 (Health, Pharma and Medtech 2021).

People infected with COVID-19 develop several types of symptoms. The most common are fever (80 - 98%), dry cough (70 - 80%) and fatigue (11 - 44%). Aches and pains, sore throat, diarrhea, conjunctivitis, headache, loss of taste or smell, and a rash or discoloration of the fingers or toes are the least common symptoms. Serious symptoms include difficulty breathing or shortness of breath, pain or pressure in the chest, and loss of speech or movement (Adhikari *et al.*, 2020b; WHO, 2021b). The severity of these symptoms lies in the ability of SARS-CoV2 to attack the respiratory tract of infected people (Adhikari *et al.*, 2020b). The concern of this pandemic has encouraged the search for therapeutic solutions all over the world with different approaches. Pharmaceutical companies and scientists have been called upon to make significant contributions toward the development of a vaccine for prevention and a remedy to ensure an effective treatment in order to meet the health challenges facing the World Health Organization (WHO). Since then, many research projects have been undertaken for the discovery of bioactive molecules for the management of coronavirus disease. The results of this research have led to the development of several anti-covid. These are AstraZeneca/Oxford vaccine, Johnson and Johnson, Moderna, and Pfizer/BionTech, which are approved for use by the World Health Organization (WHO 2021c).

However, at this stage, although there are ongoing clinical trials of antiviral and immune therapies, there are no clinically effective pharmacological treatments for COVID-19. In addition, the search for solutions in alternative medicine has also been put to contribute to the fight against this pandemic (Nugraha *et al.*, 2020; Charan *et al.*, 2020). The recourse to this traditional medicine based mainly on the use of medicinal plants is justified since 80% of the world's population uses it as a first reflex for their well-being (OMS 2002). In China, the country where the pandemic was triggered, herbal medicine has a very important place (Lu *et al.*, 2004). On January 27, 2020, the General Office of the National Health, Health Commission of China and The Office of the State Administration of Traditional Chinese Medicine released an updated protocol for the diagnosis and treatment of pneumonia caused by Coronavirus infection which now included a Chinese herbal treatment program (Luo *et al.*, 2020; Zhang *et al.*, 2020; Li *et al.*, 2020).

Africa has a great ethnobotanical potential (Mahomoodally 2013). The richness of its medicinal flora has been put to use for the prevention and strengthening of the immune system of the populations during this coronavirus pandemic (Helali *et al.*, 2020; Haidara *et al.*, 2020). Togo, Benin, Ghana, Burkina Faso and Cape Verde are five West African countries with floristic diversity that could be useful in the fight against this pandemic (Adjanohoun *et al.*, 1986; Akoègninou *et al.*, 2006; Romeiras *et al.*,

2011; Addo-Fordjour *et al.*, 2012; Zizka *et al.*, 2015). The population of these countries uses medicinal plants as a preventive and symptomatic treatment to accompany the barrier measures issued by their authorities. The present study is a contribution of ethnobotany and ethnopharmacology to the control of coronavirus infection in West Africa. It is a literature review on medicinal plants potentially capable of preventing and/or treating coronavirus infection in Benin, Togo, Burkina Faso, Ghana, and Cape Verde.

Body

Methods

Data available in the scientific literature on medicinal plants used in Benin, Togo, Ghana, Burkina Faso, and Cape Verde that can prevent or treat Covid symptoms were searched in the following databases: PubMed, Google Scholar, Science Direct, Scopus and Embase. The data were collected from January 2021 to May 2021. The selection of plants is based on their potential to treat the recognized symptoms of coronavirus disease which is a viral disease. Indeed, the use of medicinal plants in the traditional treatment of viral infections is well documented (Mukhtar *et al.*, 2008a; Adhikari *et al.*, 2020a). Considering all the symptoms of coronavirus disease including the most common ones (fever/malaria, dry cough, fatigue), it was hypothesized that a medicinal plant capable of treating at least three of the symptoms, especially the most common ones, is a potentially effective source in the treatment of Covid-19 (Fongnzossie Fedoung *et al.*, 2021).

The phytochemical profile of these plants was explored to identify the secondary molecules potentially responsible for pharmacological effects useful in the treatment of Covid-19. The last step of this data analysis is related to the pharmacological properties of medicinal plants that could be associated with plants with beneficial effects on Covid-19 management. To this end, medicinal plants with antiviral, anti-inflammatory, anti-malarial and immunostimulant properties are considered potentially effective in covid-19 management.

Results

A total of 152 medicinal plants were identified in the scientific literature of the five countries studied (Ghana, Benin, Togo, Burkina Faso and Cape Verde) (Table 1). One hundred and sixteen (116) plants are used in Benin, 79 in Togo, 58 in Ghana, 23 are used in Burkina Faso and 9 in Cape Verde. Several of these plants are used in common in the above-mentioned countries.

Table 1. Plant species used to manage at least 3 COVID 19 symptoms in Benin, Ghana, Togo, Burkina Faso and Cape Verde.

N°	Species	Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
1	*Acacia pennata* (L.) Willd.	Leguminosae	Nwere (G) Hlafen (T)	L	Fever/malaria, Fatigue, Cough	G, T	(Gbekley *et al.*, 2017; Appiah *et al.*, 2019)
2	*Acacia senegalensis* (Houtt.) Roberty	Leguminosae	Unknown (G)	L	Fever, Fatigue, Diarrhoea, Dry Cough	G	(Boadu and Asase 2017)
3	*Acanthospermum hispidum* DC.	Compositae	Klagbe ngua (G) Dameleatsunugon (T) Ahanglon (B) carrapiça (CV)	L	Fever/malaria, Fatigue, Headach	G, B, T, CV	(Hermans *et al.*, 2004; Asase *et al.*, 2005; Koudouvo *et al.*, 2011; Romeiras *et al.*, 2011; Adomou *et al.*, 2012; Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)
4	*Acridocarpus smeathmanii* (DC.) Guill. & Perr.	Malpighiaceae	Gbanguinado (B)	R	Fever/malaria, Fatigue Headach	B	(Hermans *et al.*, 2004)
5	*Adansonia digitata* L.	Malvaceae	Kpassagoto (B), Adoditsi (T) calabaceira (CV)	b	Fever/malaria,Cough,Fatigue	B,T, CV	(Hermans *et al.*, 2004; Koudouvo *et al.*, 2011; Romeiras *et al.*, 2011; Agbodeka *et al.*, 2016; Gbekley *et al.*, 2017)

6	*Aframomum melegueta* K.Schum.	Zingiberaceae	Atacoun (B,T)	F	Cough, Fever, Fatigue Headach	B	(Hermans *et al.*, 2004)
7	*Agelaea pentagyna* (Lam.) Baill.	Connaraceae	Ahanhlazu (B)	F	Cough, Fever, Fatigue	B	(Hermans *et al.*, 2004)
8	*Albizia ferruginea* (Guill. & Perr.) Benth.	Leguminosae	Awiemtosamina (Akuapem) (G)	L	Diarrhoea,Fatigue, Fever	G	(Boadu and Asase 2017)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
9	*Alchornea cordifolia* (Schumach. & Thonn.) Müll.Arg.	Euphorbiaceae	Ogyama (G) Avovlo (T)	b	Fever/malaria,Cough,Fatigue	G, T	(Koudouvo *et al.*, 2011; Agbodeka *et al.*, 2016; Appiah *et al.*, 2019)
10	*Allium sativum* L.	Amaryllidaceae	Garlic (G), Ayo(B, T)	Cl, Rh	Cough, Fever, Fatigue	G, T	(Nguta *et al.*, 2015; Agbodeka *et al.*, 2016; Appiah *et al.*, 2019)
11	*Aloe buettneri* A. Berger	Xanthorrhoeaceae	Naa Nansoulmre (T)	R	Fever/malaria, Cough, Headach, Fatigue	T	(Kpabi *et al.*, 2020)
12	*Alstonia boonei* De Wild.	Apocynaceae	Nyamedua (G,T)	b	Fever/malaria, Cough, Fatigue	B, G, T	(Hermans *et al.*, 2004; Koudouvo *et al.*, 2011; Appiah *et al.*, 2019)
13	*Amaranthus spinosus* L.	Amaranthaceae	Nantwibini	WP	Fever/malaria; Diarrhoea, Fatigue	G	(Nguta *et al.*, 2015)
14	*Ampelocissus bombycina* (Baker) Planch.	Vitaceae	Tèkplè (B) Adidoyo (T)	S-L, L	Fever/malaria Headach, Fatigue	B, T	(Hermans *et al.*, 2004; Adomou *et al.*, 2012; Agbodeka *et al.*, 2016)
15	*Anacardium occidentale* L.	Anacardiaceae	Anansara-kpagna (T) Yovotsan (T)	b	Fever/malaria, Headach, Diarrhoea	T	(Agbodeka *et al.*, 2016; Kpabi *et al.*, 2020)
16	*Ananas comosus* (L.) Merr.	Bromeliaceae	Blefo Nmer (G) Atoto (T)	F	Fever/malaria, Cough, Headach	G, T	(Asase *et al.*, 2010; Agbodeka *et al.*, 2016; Koudouvo *et al.*, 2017a; Appiah *et al.*, 2019; Kpabi *et al.*, 2020)
17	*Annona senegalensis* Pers.	Annonaceae	Amoumode (T), Wiglédo (B) Gini kuun (B)	L	Fever/malaria, Cough, Fatigue	B, T, Bu	(Sanon *et al.*, 2003; Hermans *et al.*, 2004; Agbodeka *et al.*, 2016; Kpabi *et al.*, 2020)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
18	*Anogeissus leiocarpa* (DC.) Guill. & Perr.	Combretaceae	Hlihon (B)	L	Fever/malaria, Cough, Fatigue	B, Bu	(Hermans *et al.*, 2004; Compaoré *et al.*, 2018)
19	*Argemone mexicana* L.	Papaveraceae	Houetchegnon (B)	L, Fl, F	Fever/malaria, Fatigue, Headach	B, Bu	(Hermans *et al.*, 2004; Yetein *et al.*, 2012; Compaoré *et al.*, 2018)
20	*Artemisia annua* L.	Compositae	Artemisia	L	Fever/malaria,Cough,Fatigue	B, T, CV	(Akoègninou *et al.*, 2006; Silva *et al.*, 2011; Agbodeka *et al.*, 2016)
21	*Artemisia gorgonum* Webb	Compositae	Artemisia	AP	Fever/malaria, Headach, Diarrhoea	CV	(Silva *et al.*, 2011)
22	*Astraea lobata* (L.) Klotzsch	Euphorbiaceae		S-L, R	Fever, Headach, Fatigue	B	(Hermans *et al.*, 2004)
23	*Azadirachta indica* A. Juss	Meliaceae	Kininoutin (B) Kintsi (G) Niim (T) Nímì (Bu)	L, b	Fever/malaria, Headach, Fatigue	G, B, T, Bu	(Zerbo *et al.*, 2007; Asase *et al.*, 2010; Yetein *et al.*, 2012; Nguta *et al.*, 2015; Agbodeka *et al.*, 2016; Boadu and Asase 2017; Kpabi *et al.*, 2020)
24	*Bambusa vulgaris* Schrad.	Poaceae	Pamplo (G) Pamplotsi (T)	L	Fever/malaria, Headach, Cough	G, T	(Asase *et al.*, 2010; Agbodeka *et al.*, 2016)
25	*Bauhinia thonningii* Schum.	Leguminosae	Pokou (T) Klo /	L,b	Fever/malaria, Cough,	T, Bu	(Zerbo *et al.*, 2007; Agbodeka *et*

			Agoemakpa (T) Gôntôrô (Bu)		Fatigue		*al.*, 2016; Compaoré *et al.*, 2018; Kpabi *et al.*, 2020)
26	*Bridelia ferruginea* Benth.	Phyllanthaceae	Honssoukuékué (B) Kolou (T)	L, R	Diarrhoea, Fever/malaria,Cough	B, G, T	(Hermans *et al.*, 2004; Agbodeka *et al.*, 2016; Gbekley *et al.*, 2017)
27	*Caesalpinia bonduc* (L.) Roxb.	Leguminosae	Adjikoui (B) Adikou (T)	R	Fever/malaria, sore throats, fatigue	B, T	(Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
28	*Caesalpinia pulcherrima (L.)* Sw	Leguminosae	Orgueil de Chine (B,T)	L, F	Fever/malaria,Cough,Fatigue	B, T	(Koudouvo *et al.*, 2011; Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)
29	*Cajanus cajan* (L.) Millsp	Leguminosae	Djayéman / Klwékounman (B)	L	Sore throats,Fever, Cough	B	(Hermans *et al.*, 2004; Yetein *et al.*, 2012)
30	*Calotropis procera* (Aiton) Dryand.	Apocynaceae	Pommier de sodome (T) Sɛmɛlɛfu (Bu)	L, b	Fever, Cough, Cough	B, T	(Yetein *et al.*, 2012; Gbekley *et al.*, 2017)
31	*Carica papaya* L.	Caricaceae	Kpintin/Gbekpê (B), Adeba (G) Adibgou (T) Nassankrù (Bu)	L, F	Fever/malaria, Cough, sore throats	B, G, T, Bu	(Hermans *et al.*, 2004; Zerbo *et al.*, 2007; Asase *et al.*, 2010; Yetein *et al.*, 2012; Agbodeka *et al.*, 2016; Appiah *et al.*, 2019; Kpabi *et al.*, 2020)
32	*Carissa spinarum* L.	Apocynaceae	Ahanzodo (B)	L	Fever/malaria, Cough, Fatigue	B	(Hermans *et al.*, 2004)
33	*Cassytha filiformis* L.	Lauraceae	Agbègbèkan (B,T)	WP	Fever/malaria, Cough, Fatigue	B	(Hermans *et al.*, 2004)
34	*Chassalia kolly* (Schumach.) Hepper	Rubiaceae	Djètiman	L,R	Fever/malaria, Cough, Fatigue	B	(Hermans *et al.*, 2004)
35	*Chrysophyllum albidum* G.Don	Sapotaceae	Azonbobwe/Azonvivo (B)	L	Fever/malaria, Cough, Fatigue	B	(Yetein *et al.*, 2012)
36	*Citrus aurantiifolia* (Christm.) Swingle	Rutaceae	Klé (B), Abonua (G), Ankaa twade (G)	L, F	Fever,Cough,migraines, Fatigue	B, G, T	(Hermans *et al.*, 2004; Asase *et al.*, 2010; Koudouvo *et al.*, 2011; Agbodeka *et al.*, 2016; Appiah *et al.*, 2019)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
37	*Citrus* × *aurantium* L.	Rutaceae	N'ti (T)	F	Cough, Fever,Fatigue , sore throats	B, T	(Hermans *et al.*, 2004; Agbodeka *et al.*, 2016)
38	*Citrus limon* (L.) Osbeck	Rutaceae	Gnigna-lemou (T)	L	Cough, Fever, Fatigue	B, T	(Hermans *et al.*, 2004; Gbekley *et al.*, 2017)
39	*Citrus sinensis* (L.) Osbeck	Rutaceae	Ankaa (G), Lemou (T) N'titi (T)	L	Fever/malaria, Diarrhoea,Cough, Fatigue	G, T	(Koudouvo *et al.*, 2011; Gbekley *et al.*, 2017; Appiah *et al.*, 2019; Kpabi *et al.*, 2020)
40	*Clausena anisata* (Willd.) Hook.f. ex Benth.	Rutaceae	Gbossouazohouin (B) Eyra (T)	L	Sore throats, Fever, Fatigue	B, T	(Hermans *et al.*, 2004; Yetein *et al.*, 2012)
41	*Cleistopholis patens* (Benth.) Engl. & Diels	Annonaceae	Ngone nkyene (G)	L, b,F	Stomach ache, Fever/Malaria, Fatigue	G	(Appiah *et al.*, 2019)
42	*Cleome gynandra* L.	Cleomaceae	akaya asi (B)	L	Stomach ache, Fever/Malaria, Fatigue	B	(Yetein *et al.*, 2012)
43	*Cnestis ferruginea* Vahl ex DC.	Connaraceae	Gboviahu (T)	S-L	Stomach ache, Cough, Fever/Malaria	B	(Hermans *et al.*, 2004; Adomou *et al.*, 2012)
44	*Cocos nucifera* L.	Arecaceae	Akoshi (G), Anansara-kpakpar (T)	L, R, F	Cough, Fever, Fatigue	B; G, T	(Hermans *et al.*, 2004; Asase *et al.*, 2010; Koudouvo *et al.*, 2011; Yetein *et al.*, 2012; Nguta *et al.*, 2015; Agbodeka

							et al., 2016)
45	*Cola millenii* K. Schum.	Malvaceae	Alovi aton (B) Kpandotsi (T)	L	Fever/malaria, Fatigue,Stomach ache	B, T	(Hermans *et al.*, 2004; Agbodeka *et al.*, 2016)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
46	*Commelina benghalensis* L.	Commelinaceae	Azibligokoun (B)	L	Fever, Cough,Fatigue, Diarrhoea	B	(Yetein *et al.*, 2012)
47	*Combretum glutinosum* Perr. ex DC	Combretaceae	magbevide (B)	L	Fever/malaria, Stomach ache, Fatigue	B, Bu	(Hermans *et al.*, 2004; Compaoré *et al.*, 2018)
48	*Combretum micranthum* G. Don	Combretaceae	Wonwon (T) Giaãn (Bu)	L, R	Fever/malaria, Cough, Stomach ache,	T, Bu	(Zerbo *et al.*, 2007; Agbodeka *et al.*, 2016; Kpabi *et al.*, 2020)
49	*Copaifera salikounda* Heckel	Leguminosae	Otedua (Akuapem) (G)	b	Fever/malaria, sore throats, Fatigue	G	(Boadu and Asase 2017)
50	*Costus afer*Ker Gawl.	Costaceae	Trétrégougou (B) Tetegugu (T)	L, S	Fever/malaria, Fatigue, Stomach ache	B,T	(Hermans *et al.*, 2004; Yetein *et al.*, 2012)
51	*Crateva adansonii* DC.	Capparaceae	Onton zuinzuin(B)	L	Diarrhoea,Fever, Fatigue	B	(Hermans *et al.*, 2004; Yetein *et al.*, 2012)
52	*Cymbopogon citratus* (DC.) Stapf	Poaceae	Tea ba (G), Tsigbe (T)	L	Fever/malaria, Cough, Fatigue	B, G, T	(Hermans *et al.*, 2004; Asase *et al.*, 2010; Gbekley *et al.*, 2017; Appiah *et al.*, 2019)
53	*Cyperus esculentus* L.	Cyperaceae	Afiyo (B)	L	Fever/malaria, Cough, Fatigue	B	(Yetein *et al.*, 2012)
54	*Daniellia oliveri* (Rolfe) Hutch. & Dalziel	Leguminosae	Tchade (T)	L	Fever/malaria, Cough, Fatigue	T	(Kpabi *et al.*, 2020)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
55	*Deinbollia pinnata* (Poir.) Schumach. & Thonn.	Sapindaceae	Adon (G)	L	Fever/malaria, Cough, Fatigue	G	(Asase *et al.*, 2005)
56	*Desmodium ramosissimum* G. Don	Leguminosae	Zedali	L	Fever/malaria, Cough, Fatigue	B	(Yetein *et al.*, 2012)
57	*Dialium guineense* Willd	Leguminosae	Assouinssouinman(B)	L	Fever/malaria, Cough, Fatigue	B	(Adomou *et al.*, 2012; Yetein *et al.*, 2012)
58	*Dichapetalum madagascariense* Poir	Dichapetalaceae	Gbaglo/Aniclovodjou (B)	L	Fever/malaria, Cough, Fatigue	B	(Akoègninou *et al.*, 2006; Adomou *et al.*, 2012; Yetein *et al.*, 2012)
59	*Dracaena arborea* (Willd.) Link	Asparagaceae	Anyantsi (T)	L	Fever/malaria, Stomach ache, fatigue	T	(Koudouvo *et al.*, 2011; Agbodeka *et al.*, 2016)
60	*Dysphania ambrosioides* (L.) Mosyakin & Clemants	Amaranthaceae	Azongbidiwa/Gbidiwa (B)	L	Fever, stomach ache, Fatigue	B, G, CV	(Romeiras *et al.*, 2011; Yetein *et al.*, 2012; Nguta *et al.*, 2015)
61	*Elaeis guineensis* Jacq	Arecaceae	Abe, Ngbe (G) Detsi (T)	Fl, R	Fever/malaria, Cough, Fatigue	B,G,T	(Asase *et al.*, 2005; Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)
62	*Entada africana* Guill. & Perr	Leguminosae	Kakê (B)	b	Fever/malaria, Cough, Fatigue	B	(Yetein *et al.*, 2012)
63	*Eucalyptus globulus* Labill.	Myrtaceae	Anansara-tii (B) Eucalyptus (T)	L	Cough,Fever/malaria, Fatigue	T	(Gbekley *et al.*, 2017; Kpabi *et al.*, 2020)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference

64	*Euphorbia hirta* L.	Euphorbiaceae	Kakaweadwe (B) Hundihundi (T) Nââ yonu (Bu)	R, WP	Severe Cough, Fever, Fatigue	G, T,Bu	(Zerbo *et al.*, 2007; Gbekley *et al.*, 2017; Appiah *et al.*, 2019)
65	*Ficus exasperata* Vahl	Moraceae	Katsaplala (T)	L	Fever/malaria, Fatigue, Stomach ache	B	(Hermans *et al.*, 2004)
66	*Flacourtia Indica* (Burm.f.) Merr	Salicaceae	Gbohoucadje/Assanhoun (B)	L	Stomach ache, Diarrhoea, Fever	B	(Yetein *et al.*, 2012)
67	*Flueggea virosa* (Roxb. ex Willd.) Royle	Phyllanthaceae	tchaka-tchaka (T) Tchakètchakè (B)	R, S-L, WP, b, L	Fever/malaria, Diarrhoea, Fatigue	B, T, G, Bu	(Sanon *et al.*, 2003; Yetein *et al.*, 2012; Agbodeka *et al.*, 2016; Kpabi *et al.*, 2020)
68	*Foeniculum vulgare* Mill.	Apiaceae	erva doce, funcho (CV)	L	Fever, Diarrhoea, Fatigue	CV	(Silva *et al.*, 2011)
69	*Gardenia ternifolia* Schumach. & Thonn.	Rubiaceae	Flifèti (T)	L	Fever/malaria, Fatigue, Stomach ache,	T	(Koudouvo *et al.*, 2011)
70	*Gardenia erubescens* Stapf & Hutch.	Rubiaceae	Adakplaman/Hemandjê (B)	L	Fever/malaria, Cough, Fatigue	B	(Yetein *et al.*, 2012)
71	*Gomphrena celosioides* Mart.	Amaranthaceae	Amegatahe (T) Adukowé (B)	S-L	Fever/malaria, Fatigue, Headach	B, T	(Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
72	*Gymnanthemum coloratum* (Willd.) H.Rob. & B.Kahn	Compositae	Kôôsafana (Bu)	L	Fever/malaria, Headach, Fatigue	Bu	(Zerbo *et al.*, 2007)
73	*Heliotropium indicum* L.	Boraginaceae	Koclossoudinkpatcha (B) Agamashike (T)	L	Fever/malaria, Cough, Fatigue	B, T	(Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)
74	*Heterotis rotundifolia*(Smith) Jac.-Fel.	Melastomataceae	Hêhêman	L	Fever/malaria, Cough, Fatigue	B	(Yetein *et al.*, 2012)
75	*Hibiscus surattensis* L.	Malvaceae	Kpofin/Kpodeman (B) Kponde (T)	L	Fever/malaria, Headach, Fatigue	B, T	(Koudouvo *et al.*, 2011; Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)
76	*Holarrhena floribunda* (G.Don) T.Durand & Schinz	Apocynaceae		L	Fever/malaria, Fatigue, Headach	B	(Yetein *et al.*, 2012)
77	*Hoslundia opposita* Vahl	Lamiaceae	Agahounman (B)	L	Headach, Fever, Fatigue	B	(Yetein *et al.*, 2012)
78	*Hybanthus enneaspermus* (L.) F. Muell.	Violaceae	abiwèrè (B)	S-L	Headach, Fever, Fatigue	B	(Adomou *et al.*, 2012)
79	*Hymenocardia acida*Tul.	Phyllanthaceae	Kantchila (T)	L	Cough, Fever/malaria, Fatigue	B, T	(Hermans *et al.*, 2004; Gbekley *et al.*, 2017)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
80	*Imperata cylindrica* (L.) Raeusch.	Poaceae	Sedo (B), Ebe (T)	R	Headach, Fever, Fatigue	B, T	(Yetein *et al.*, 2012; Agbodeka *et al.*, 2016)
81	*Jatropha curcas* L.	Euphorbiaceae	Gbaglikpotinwéwé (B)	L, S	Cough, Fatigue, Fever	B	(Yetein *et al.*, 2012)
82	*Jatropha gossypiifolia* L.	Euphorbiaceae	Gbaglikpotivovo (B) Babatsidji (T)	L, S, F, WP	Diarrhoea, Fever, Fatigue	G, B, T	(Hermans *et al.*, 2004; Koudouvo *et al.*, 2011; Boadu and Asase 2017)
83	*Justicia flava* (Forssk.) Vahl	Acanthaceae	Afama (G)	L	Fever/malaria, Diarrhoea, Fatigue	G	(Appiah *et al.*, 2019)
84	*Justicia secunda* Vahl	Acanthaceae	couchou gloutou (B)	L	Stomach ache, Fatigue, Fever	B	(Yetein *et al.*, 2012)
85	*Keetia hispida* (Benth.) Bridson)	Rubiaceae		L	Fever/malaria, Fatigue, Headach	B	(Hermans *et al.*, 2004)

86	*Khaya senegalensis* (Desv.) A. Juss.	Meliaceae	Zounzantin (B); Mahogany (G) Hermou (T) Mawug'n	L, b	Fever, malaria, Cough, Fatigue	B, G, T, Bu	(Asase *et al*., 2010; Yetein *et al*., 2012; Agbodeka *et al*., 2016; Compaoré *et al*., 2018)
87	*Kigelia africana* (Lam.) Benth.	Bignoniaceae		L,F	Fever/malaria, Fatigue, Headach	B	(Yetein *et al*., 2012)
88	*Lantana camara* L.	Verbenaceae	Hlachiayo	L	Fever/malaria, Fatigue, Cough	B	(Yetein *et al*., 2012)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
89	*Lippia multiflora* Moldenke	Verbenaceae	Nasu (G) Avudati (T)	L	Fever/malaria, Cough Headach	B, G, T	(Hermans *et al*., 2004; Asase *et al*., 2010; Koudouvo *et al*., 2017a)
90	*Mangifera indica* L.	Anacardiaceae	Amanga (B); Amango (G) Moungou (T)	L, R, b	Fever,Diarrhoea, Cough	B, G, T, Bu	(Asase *et al*., 2005; Zerbo *et al*., 2007; Koudouvo *et al*., 2011; Yetein *et al*., 2012; Gbekley *et al*., 2017)
91	*Manihot esculenta* Crantz	Euphorbiaceae	Fingnin (B) Bankye (G) mandioca (CV)	R, L, S	Fever, Cough, Fatigue	B, G, CV	(Romeiras *et al*., 2011; Adomou *et al*., 2012; Appiah *et al*., 2019)
92	*Melaleuca leucadendra* (L.) L.	Myrtaceae	Kpinmanssi Sèminton (B)	S-L	Cough, Fatigue, Fever	B	(Adomou *et al*., 2012)
93	*Mimosa quadrivalvis* var. leptocarpa (DC.) Barneby	Leguminosae		S-L	Fever,Stomach ache, Fatigue	B	(Akoègninou *et al*., 2006)
94	*Momordica charantia* L.	Cucurbitaceae	Nyensiken (B) Nyanya (G)	L,WP	Fever/malaria, Fatigue, Headach	B, G	(Yetein *et al*., 2012; Appiah *et al*., 2019)
95	*Morinda lucida* Benth.	Rubiaceae	Houensin (B), Dzadzaclahu (G) Kaklan (T)	L, WP	Fever/malaria, Fatigue, Headach	B, G, T	(Asase *et al*., 2010; Yetein *et al*., 2012; Agbodeka *et al*., 2016)
96	*Moringa oleifera* Lam.	Moringaceae	Kpatiman (B), Moringa (G), Yovovitsi (T)	L	dry Cough, Fever/malaria, Fatigue	B, G, T, Bu	(Hermans *et al*., 2004; Zerbo *et al*., 2007; Asase *et al*., 2010; Agbodeka *et al*., 2016)
97	*Musa* × *paradisiaca* L.	Musaceae	Amadan (G), Brodee (G)Banane (B, T)	R,F	Cough, Fever/malaria, Fatigue	G	(Asase *et al*., 2010; Appiah *et al*., 2019)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
98	*Mussaenda erythrophylla* Schumach. & Thonn.	Rubiaceae	Dameramma	L	Severe Cough, Fever, Fatigue	G,T	(Gbekley *et al*., 2017; Appiah *et al*., 2019)
99	*Nauclea diderrichii* (De Wild.) Merr.	Rubiaceae	Atahe (B)	b	Fever/malaria, Stomach ache, fatigue	B	(Adomou *et al*., 2012; Yetein *et al*., 2012)
100	*Sarcocephalus latifolius* (Sm.) E.A.Bruce	Rubiaceae	Nyimo (G) Nyimon (T,B)	R	Fever/malaria, Fatigue,Stomach ache	B, G,T	(Hermans *et al*., 2004; Asase *et al*., 2010; Koudouvo *et al*., 2017b)
101	*Newbouldia laevis* (P.Beauv.) Seem	Bignoniaceae	Desréguè (B) Sesemasa (G) Kpatimé(T)	L	Cough, Fever, Headach	B, G, T	(Hermans *et al*., 2004; Gbekley *et al*., 2017; Appiah *et al*., 2019)
102	*Ocimum basilicum* L.	Lamiaceae	Kesukesu/Hissihissi (B) Ahameyovoto (T)	L	Cough, Fever/malaria, Fatigue	B,T	(Adomou *et al*., 2012; Gbekley *et al*., 2017)
103	*Ocimum gratissimum* L.	Lamiaceae	Tchiayo (B) Su (G)	L	Fever/malaria,	B, G, T	(Asase *et al*., 2010; Yetein *et*

			Djovetsi / Dogotsui (T)		Stomach ache, fatigue		*al*., 2012; Agbodeka *et al*., 2016)
104	*Opilia amentalea*Roxb.	Opiliaceae	Fiodudami (T)	L	Fever/malaria, Stomach ache, Fatigue	B,T	(Hermans *et al*., 2004; Koudouvo *et al*., 2017a)
105	*Ozoroa insignis* Delile	Anacardiaceae	Korkân (Bu)	L	Stomach ache, Fatigue, Fever	Bu	(Sanon *et al*., 2003)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
106	*Pancratium tenuifolium* Hochst. ex A.Rich.	Amaryllidaceae	Ganganyonlon	L	Stomach ache, Fatigue, Cough	B	(Adomou *et al*., 2012)
107	*Paullinia pinnata* L.	Sapindaceae	Hedoulifin/Adacloman (B) Tegbekpasso /Ashiaton (T)	R, L	Fever/malaria, Stomach ache, fatigue	B, T	(Hermans *et al*., 2004; Koudouvo *et al*., 2011; Agbodeka *et al*., 2016)
108	*Pavetta corymbosa* (DC.) F.N.Williams	Rubiaceae	Lohou (B) Tsifafan (T)	L, S-L	Fever/malaria, Cough, Fatigue	B, T	(Adomou *et al*., 2012; Agbodeka *et al*., 2016)
109	*Pavetta crassipes* K.Schum	Rubiaceae	ginisu (B)	S-L	Fever/malaria, Diarrhoea, Fatigue	B, Bu	(Zerbo *et al*., 2007; Adomou *et al*., 2012)
110	*Pergularia daemia* (Forssk.) Chiov.	Apocynaceae	Kpinto (B), Kponkeke (T)	S-L	Fever/malaria, Cough, Fatigue	B,T	(Koudouvo *et al*., 2011; Adomou *et al*., 2012)
111	*Pennisetum purpureum* Schumach.	Poaceae	Fan/Fangbe'/Kpokpo	L, S	Stomach ache, Fatigue, Cough	B	(Hermans *et al*., 2004)
112	*Pericopsis laxiflora* (Baker) Meeuwen	Leguminosae	Kedere (T)	b	Cough, Fever/malaria, Fatigue	T	(Kpabi *et al*., 2020)
113	*Persea americana*Mill.	Lauraceae	Paya (B) Peyati (T) abacateiro (CV)	L	Fever/malaria, Stomach ache, fatigue	G, T,CV	(Gbekley *et al*., 2017; Appiah *et al*., 2019)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
114	*Phyllanthus amarus* Schumach. & Thonn.	Phyllanthaceae	Hlinwe (B), Ofobi okpabi (G), Kpavidetume (T)	b, WP	Dry Cough, Fever, Fatigue	B, G, T	(Hermans *et al*., 2004; Asase *et al*., 2010; Agbodeka *et al*., 2016)
115	*Polyalthia longifolia* (Sonn.) Thwaites	Annonaceae	Tsogaga (Krobo) (G)	L	Cough, Fever, Headach	G	(Boadu and Asase 2017)
116	*Psidium guajava* L.	Myrtaceae	Aguava (G) Goa (G) Goyava (T)	R, L, b	Diarrheoa, Fever,Cough,Fatigue	B, G, T	(Hermans *et al*., 2004; Agbodeka *et al*., 2016; Boadu and Asase 2017)
117	*Pteleopsis suberosa* Engl. & Diels	Combretaceae	Kassissigna (T)	b	Fever/malaria, Fatigue, Headach	T	(Kpabi *et al*., 2020)
118	*Pterocarpus erinaceus* Poir	Leguminosae	Kosso goto (B)	S-L	Fever/malaria, Fever, Fatigue	B, Bu	(Zerbo *et al*., 2007; Yetein *et al*., 2012; Compaoré *et al*., 2018)
119	*Pteridium aquilinum* (L.) Kuhn	Dennstaedtiaceae	Unknown (G)	L	Fever, Headach, Fatigue	G	(Boadu and Asase 2017)
120	*Pupalia lappacea* (L.) Juss.	Amaranthaceae	trèdoagboko (B)	WP	Cough, Fatigue, Fever	B	(Yetein *et al*., 2012)
121	*Rauvolfia vomitoria* Afzel.	Apocynaceae	Kakapenpen (B) Adbloti (T)	L, R	Fever/malaria, Cough	G, T	(Gbekley *et al*., 2017; Appiah *et al*., 2019)
122	*Rourea coccinea* (Thonn. Ex Schumach.) Benth	Connaraceae	Ganganlisse/Vikplomba (B)	L	Fever, dry Cough,migraines	B	(Yetein *et al*., 2012)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
123	*Rytigynia umbellulata* (Hiern) Robyns	Rubiaceae		L	Fever,Stomach ache, Fatigue	B	(Yetein *et al*., 2012)
124	*Saccharum officinarum* L.	Poaceae	Léké (B) Fofun (T)	S	Fever/malaria, sore throats, fatigue	B, G, T	(Asase *et al*., 2010; Yetein *et al*., 2012; Agbodeka *et al*., 2016)
125	*Sansevieria liberica* Gérôme & Labroy	Asparagaceae	Kpognando/Akpogna (B) Yobu (T)	L, R	Fever/malaria, Fatigue,	B, T	(Yetein *et al*., 2012; Agbodeka *et al*., 2016)
126	*Sarcocephalus latifolius* (Sm.) E.A.Bruce	Rubiaceae	Codô/Ekpo (B) Egbessi (T) Nyimo (G) Nyimon (T, B)	R, L	Fever/malaria, Stomach ache, fatigue	B,T,G	(Asase *et al*., 2005; Koudouvo *et al*., 2011; Kpabi *et al*., 2020)
127	*Secamone afzelii* (Roem. & Schult.) K.Schum.	Apocynaceae	Zounkoudjou (B)	S-L	Fever, Fatigue, Stomach ache	B	(Akoègninou *et al*., 2006)
128	*Sclerocarya birrea* (A.Rich.) Hochst.	Anacardiaceae	Sòrò (Bu)	b	Fever/malaria, Cough, Fatigue	Bu	(Sanon *et al*., 2003)
129	*Securidaca longipedunculata* Fresen.	Polygalaceae	Kpatado (B) Kpata (T)	R, L	Cough,Fever/malaria, Fatigue	B,T, Bu	(Adomou *et al*., 2012; Gbekley *et al*., 2017; Compaoré *et al*., 2018)
130	*Senna alata* (L).Roxb.	Leguminosae	Asentin (B), Yovologbo (T) Kassia (Bu)	L	Fever/malaria,Cough,Fatigue	G, B,Bu	(Zerbo *et al*., 2007; Asase *et al*., 2010; Adomou *et al*., 2012; Appiah *et al*., 2019)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
131	*Senna occidentalis* (L.) Link	Leguminosae	Nkorda brodia (G)	L, S, R	Fever/malaria, Cough, Diarrhoea	B, G, T	(Asase *et al*., 2010; Yetein *et al*., 2012; Agbodeka *et al*., 2016; Appiah *et al*., 2019)
132	*Senna siamea* (Lam.) H.S.Irwin & Barneby	Leguminosae	Acacia (B) Zangara tsi (G,T)	L, b R, Fl	Fever/malaria, Fatigue, Cough	B, G, T	(Akoègninou *et al*., 2006; Asase *et al*., 2010; Kpabi *et al*., 2020)
133	*Sida acuta* Burm.f.	Malvaceae	Tweta (B) Afiemè (T)	L	Cough , Sore Throat, Fever/malaria	G, T	(Agbodeka *et al*., 2016; Gbekley *et al*., 2017; Appiah *et al*., 2019)
134	*Solanum torvum* var. daturifolium (Dunal) O.E. Schulz	Solanaceae	Abedrow (G)	F	Fever,Stomach ache, Fatigue	G	(Asase *et al*., 2010)
135	*Spathodea campanulata* P.Beauv.	Bignoniaceae	Kuakuanisuo (G)	b	Fever/malaria, Headach, Stomach ache	G	(Appiah *et al*., 2019)
136	*Spondias mombin* L.	Anacardiaceae	Aklikotsi (T)	L	Fever, dry Cough,migraines	B,T	(Akoègninou *et al*., 2006; Koudouvo *et al*., 2011; Gbekley *et al*., 2017)
137	*Strophanthus hispidus* DC.	Apocynaceae	dikwi	L, R, F	Headach, Fatigue, Fever	B	(Akoègninou *et al*., 2006)
138	*Tamarindus indica* L.	Leguminosae	Djèvivigoto (B) Tikéssigbé (T)	L, b	Fever,Stomach ache, Fatigue	B, T	(Koudouvo *et al*., 2011; Adomou *et al*., 2012; Yetein *et al*., 2012)
139	*Taraxacum campylodes* G.E.Haglund	Compositae	Dandelion	L, R	Fever, Fatigue, Stomach ache	G	(Appiah *et al*., 2019)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
140	*Tectona grandis* L.f	Lamiaceae	Teckitin (B) Polutsi, Poltso (G), Tèkiti (T)	L	Fever/malaria, Stomach ache, Cough	B, G, T, Bu	(Zerbo *et al*., 2007; Asase *et al*., 2010; Koudouvo *et al*., 2011; Yetein *et al*., 2012)
141	*Terminalia avicennioides* Guill. & Perr.	Combretaceae	Kôõ (Bu)	b, L	Fever/malaria, Stomach ache, Fatigue	Bu	(Sanon *et al*., 2003; Zerbo *et al*., 2007)

142	*Terminalia catappa* L.	Combretaceae	Abrofo nkateɛ (G)	L	Fever/malaria, Cough, Stomach ache	G	(Appiah *et al*., 2019)
143	*Terminalia glaucescens* Planch. ex Benth.	Combretaceae	Alotoudo	R	Cough, Stomach ache, Fatigue	B	(Akoègninou *et al*., 2006)
144	*Thalia geniculata* L.	Marantaceae	Afléman (B)	R	Cough, Stomach ache, Fatigue	B	(Akoègninou *et al*., 2006)
145	*Theobroma cacao* L.	Malvaceae	Cocoa (G)	L	Cough, Stomach ache, fatigue	G	(Asase *et al*., 2010)
146	*Trichilia prieuriana* A.Juss.	Meliaceae	Tchivi (B)	L	Cough, Stomach ache, fatigue	B	(Akoègninou *et al*., 2006)
147	*Uvaria chamae* P.Beauv.	Annonaceae	Aylaha (B) Agbanletsi (T)	L, R	Cough, Fever/malaria, Fatigue	B, T	(Yetein *et al*., 2012; Agbodeka *et al*., 2016; Koudouvo *et al*., 2017b; Gbekley *et al*., 2017)

Table 1 continued

N°	Species	Plant Family	Local name (s)	Parts used	Symptoms treated	Country	Reference
148	*Vernonia amygdalina* Delile	Compositae	Amanvivè (B) Awunyun (Akuapem) (G) Gbondutsi (T)	L, WP	Fever/Malaria,Diarrhoea, Fatigue	B, G, T	(Asase *et al*., 2010; Agbodeka *et al*., 2016; Boadu and Asase 2017; Appiah *et al*., 2019)
149	*Withania chevalieri* A.E.Gonç.	Solanaceae		L	Fever/Malaria,Diarrhoea, Fatigue	CV	(Silva *et al*., 2011)
150	*Xylopia aethiopica* (Dunal) A. Rich	Annonaceae	Eso (T) kpejelekun (B)	F	Stomach ache, Fatigue, Fever	B,T	(Akoègninou *et al*., 2006; Koudouvo *et al*., 2017a)
151	*Zanthoxylum zanthoxyloides* (Lam.) Zepern. & Timler	Rutaceae	Kalwouo (T) Hedo (B)	L	Fever/malaria, Cough, Headach	B, T, Bu	(Akoègninou *et al*., 2006; Koudouvo *et al*., 2011; Compaoré *et al*., 2018)
152	*Zingiber officinale* Roscoe	Zingiberaceae	Dotê (B,T)	F	Fever/malaria, Cough, Fatigue	B, G,T	(Koudouvo *et al*., 2011; Yetein *et al*., 2012; Nguta *et al*., 2015)

Legends:

Parts used: L: Leaves; R: Root, WP: Whole Plant, B: Bark; F: Fruit; S: Seeds, AP: Aerial Parts; St: Stem, S-L: Stem-leaves; C: Cloves, Rh: Rhizome, Fl: Flower.

Country and local name: B: Benin, T: Togo, G: Ghana, Bu: Burkina Faso, CP: Cape Verde.

The plants collected belong to 53 botanical families. The five most represented families are Leguminosae, Rubiaceae, Apocynaceae, Combretaceae and Compositae (Fig. 1).These plants are used in the traditional treatment of symptoms such as fever, cough, fatigue, stomachache, sore throat and headache. All the plants listed treat at least three of the symptoms of Covid-19. Different plant organs are used for this purpose (Fig. 2). Leaves, roots, bark and fruits are the most used.

Table 2. Scientific validation of pharmacological properties of some medicinal plant recorded.

Species	Plant Family	Main phytochemicals compounds	Pharmacological properties
Acacia pennata (L.) Willd.	Leguminosae	steroids, glycosides, polyphenolic compounds (Zothantluanga *et al*., 2020)	Anti-inflammatory (Dongmo *et al*., 2005)
Acanthospermum hispidum DC.	Compositae	Phenolic compounds, Alkaloids, flavonoids (Roy 2010)	Antiviral (Summerfield *et al*., 1997) antiplasmodial (Koukouikila-Koussounda *et al*., 2012), antimalrial (Bero *et al*., 2009)
Acridocarpus smeathmanii (DC.) Guill. & Perr.	Malpighiaceae	Phenolic coumpound, flavonoids (Kale *et al*., 2019)	Antioxidant (Oluwafemi *et al*., 2019)
Adansonia digitata L.	Malvaceae	Phenolic, flavonoids (Braca *et al*., 2018)	Antiviral (Hudson *et al*., 2000), Antiinflamatory (Fatema *et al*., 2015)
Aframomum melegueta K.Schum.	Zingiberaceae	Alkaloids, Phenolic, flavonoids (So *et al*., 2014)	Antiviral (Ojo *et al*., 2009)

Azadirachta indica A. Juss	Meliaceae	Polyphenolic compounds, Alkaloids (Mistry *et al.*, 2014)	Antiviral (Faccin-Galhardi *et al.*, 2012)
Clausena anisata (Willd.) Hook.f. ex Benth.	Rutaceae	Tannins, alkaloids, steroids, saponins, phenolics, flavonoids, cardiac glycosides and anthraquinones glycosides (Agyepong *et al.*, 2014)	Antiviral (Ayisi and Nyadedzor 2003) Anti-inflammatory (Kumatia *et al.*, 2017)
Cleome gynandra L.	Cleomaceae	Polyphenols, glucosinates and terpernoids (Moyo and Aremu 2021)	Anti-inflammatory (Narendhirakannan *et al.*, 2005)
Cnestis ferruginea Vahl ex DC.	Connaraceae	Saponin, flavonoid, cardiac glycoside, anthraquinone, tannin and reducing sugar (Enemor *et al.*, 2015)	Anti-inflammatory (Ishola *et al.*, 2011)
Mangifera indica L.	Anacardiaceae	Flavonol glycosides (Berardini *et al.*, 2005)	Anti-inflammatory (Márquez *et al.*, 2010) Antiviral (Al-rawi *et al.*, 2019)
Momordica charantia L.	Cucurbitaceae	alkaloids, glycosides, aglycone, tannin, sterol, phenol and protein (Tongia *et al.*, 2004)	Antiviral (Pongthanapisith *et al.*, 2013)
Moringa oleifera Lam.	Moringaceae	Alkaloids, carbohydrates, tannins, phenolic compounds, terpenoids, cardiac glycosides, amino acids (Bagheri *et al.*, 2020)	Antiviral (Biswas *et al.*, 2020)
Ocimum gratissimum L.	Lamiaceae	Polyphenols, flavonoids and fatty acids (Venuprasad *et al.*, 2014)	Antiplasmodial (Kpadonou Kpoviessi *et al.*, 2014), antiviral (Ayisi and Nyadedzor 2003)
Phyllanthus amarus Schumach. & Thonn.	Phyllanthaceae	Tannins, terpenes, alkaloids, glycosidic compounds, saponins, and flavones (Nisar *et al.*, 2018)	Antiviral (Mukhtar *et al.*, 2008b)
Tectona grandis L.f	Lamiaceae	Alkaloids, carotenoids and tannins (Olanrewaju - Ogunmefun *et al.*, 2017)	Anti-inflammatory (Giri and Varma 2015) Antiplasmodial (Komlaga *et al.*, 2016) Antiviral (Sangeetha *et al.*, 2017)

The use of leaves of medicinal plants in traditional medicine does not threaten biodiversity as much as the use of roots. Several pharmacological and phytochemical studies have been conducted on most of the identified plants.

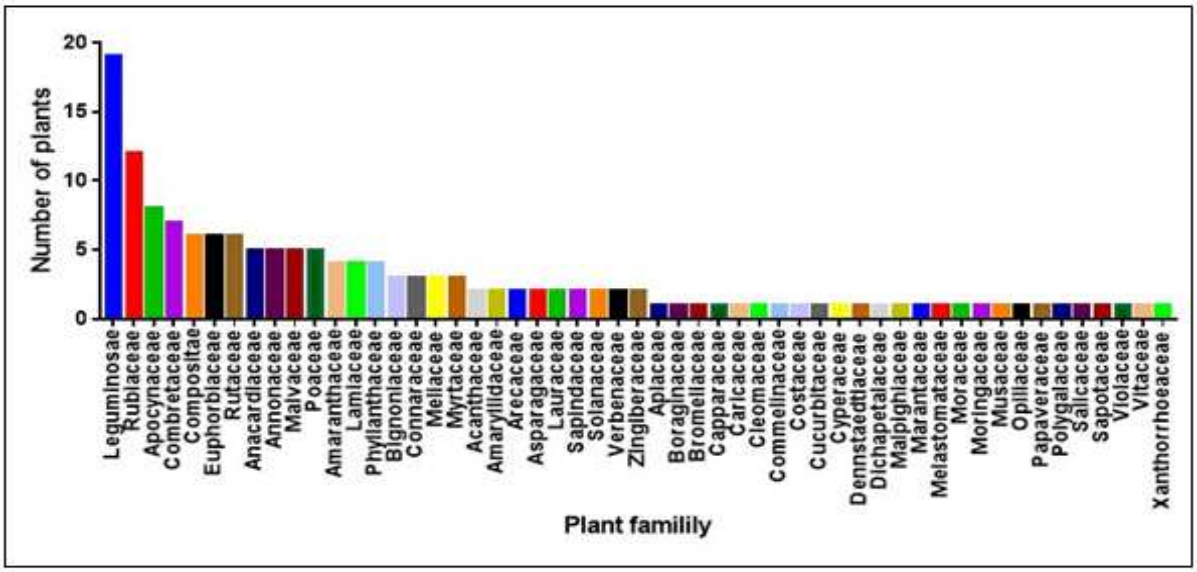

Fig. 1. Botanical families of the medicinal plants recorded.

The data collected in this sense highlight the antioxidant, anti-inflammatory, antiviral, anti-malarial properties favorable to a therapeutic potential against the symptoms of Covid-19. These data are supported by the main phytochemical compounds of these medicinal plant. These data are presented in Table 2.

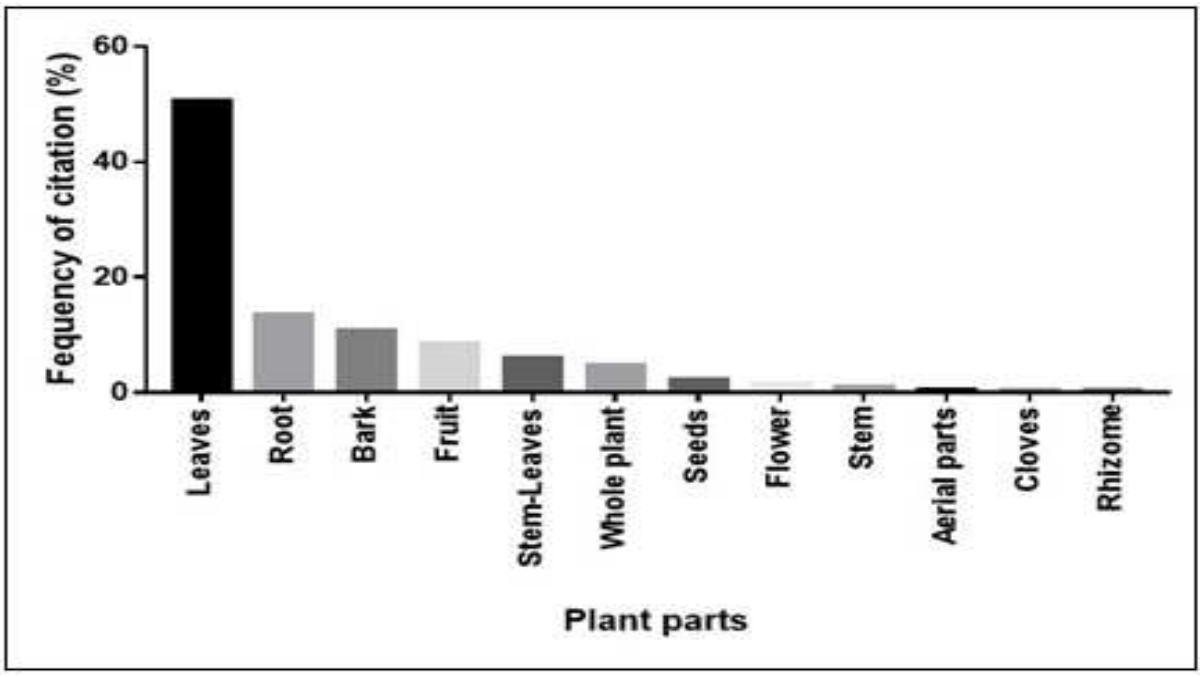

Fig. 2. Frequency of use of the plant organs of the plants recorded.

Conclusion

Research on ethnobotany, ethnopharmacology and bioactive components of medicinal plants has been conducted for a long time by research centers. The results of this research have highlighted the exploration of many pharmacological properties. However, the valorization of these research results by the development of phytomedicine is not yet proportional to the mass of scientific productions. It is necessary to deepen the fundamental research on medicinal plants for the effective care of the population whose traditional medicine constitutes their first reflex. In this study, the plants identified, some of which have been the subject of some pharmacological investigations, constitute reliable ethnopharmacological documentation on which more in-depth studies can be based for an effective fight against diseases that decimate the population, such as coronaviruses. The present study is a contribution of ethnobotany and ethnopharmacology to the fight against coronavirus. Pharmacological tests were not performed to confirm the therapeutic suspicions revealed by the data collected.

Data availability

All the data used to support the results of this study are included within the manuscript.

Conflicts of interest

There is no conflict of interest about this manuscript.

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