**Bioactivities of the Genus *Combretum* (Combretaceae): A Review**

Gedson Rodrigues de Morais Lima, Igor Rafael Praxedes de Sales, Marcelo Ricardo Dutra Caldas Filho, Neyres Zínia Taveira de Jesus, Heloína de Sousa Falcão, José Maria Barbosa-Filho, Analúcia Guedes Silveira Cabral, Augusto Lopes Souto, Josean Fechine Tavares and Leônia Maria Batista *

Department of Pharmaceutical Sciences, Federal University of Paraíba, João Pessoa 58051-970, PB, Brazil; E-Mails: gedson@ltf.ufpb.br (G.R.M.L.); igor_caraubas@hotmail.com (I.R.P.S.); marcelo.dutra@ltf.ufpb.br (M.R.D.C.F.); neyresj@hotmail.com (N.Z.T.J.); heloinafalcao@yahoo.com.br (H.S.F.); jbarbosa@ltf.ufpb.br (J.M.B.-F.); analucia.guedes@gmail.com (A.G.S.C.); augustosouto@gmail.com (A.L.S.); josean@ltf.ufpb.br (J.F.T.)

* Author to whom correspondence should be addressed; E-Mail: leoniab@uol.com.br; Tel.: +55-83-3216-7003; Fax: +55-83-3216-7502.

Received: 18 May 2012; in revised form: 23 July 2012 / Accepted: 25 July 2012 / Published: 2 August 2012

**Abstract:** The Combretaceae is a large family of herbs, shrubs and trees, comprising about 20 genera and 600 species with tropical distribution around the globe and centers of diversity in Africa and Asia. Some *Combretum* species are extensively used in traditional medicine against inflammation, infections, diabetes, malaria, bleeding, diarrhea and digestive disorders and others as a diuretic. The present work is a literature survey of *Combretum* species that have been evaluated for their ability to exert biological activities. A total number of 36 *Combretum* species are discussed with regard to plant parts used, component tested and bioassay models. This review is of fundamental importance to promoting studies on *Combretum* species, thereby contributing to the development of new therapeutic alternatives that may improve the health of people suffering from various health problems.

**Keywords:** Combretaceae; *Combretum*; bioactivity; medicinal plants; natural products; review
1. Introduction

Medicinal plants have been used since ancient times in virtually all cultures as a source of medicines [1], and are of great importance to the health of individuals and communities [2]. Traditional medicine is used in all parts of the World and has a rapidly growing economic importance, mainly through the use of medicinal plants, especially in developing countries [3]. The medicinal use of plants of the family Combretaceae is widely described in the scientific literature [4–6]. This family is distributed in approximately 20 genera with 600 species. The largest genera are Combretum and Terminalia, with about 370 and 200 species, respectively [7]. Members of the Combretaceae occur mainly in tropical and subtropical areas, for example, in Africa and Brazil.

Phytochemical Components Isolated from the Active Combretum Species

Phytochemical studies carried out in the genus Combretum have demonstrated the occurrence of many classes of constituents, including triterpenes, flavonoids, lignans and non-protein amino acids, among others [7]. Since the 1970s, several unusual compounds have also been isolated from Combretum species, for example, 9,10-dihydrophenanthrenes and a substituted bibenzyl from C. molle [8]. Bisoli et al. isolated 11 triterpenes and their glycosides from C. laxum, among them, oleanane-, ursane- and lupane-type such as arjunolic acid, arjunguloside II, bellericoside, chebuloside II, quadranoside IV, asiatic acid and betulinic acid [9]. Cycloartane dienone lactone was isolated from C. quadrangularare [10], and alkaloids (combretine and betonicine) from the leaves of C. micranthum [11]. Some flavonoids, rhamnocitrin (Figure 1A), quercetin-5,3′-dimethylether (Figure 1B), rhamnazin (Figure 1C) and kaempferol were isolated from C. erythrophyllum [12], as well as quercetin, kaempferol and pinocembrin (flavanone) from C. apiculatum [13]. Cardamonin (chalcone) was also isolated from C. apiculatum [13] and ellagic acid derivatives from C. kraussii [14]. Combretastatins, a group of stilbenes, have been isolated from several species of Combretum [15].

As referenced above, there are several studies describing the phytochemistry of the species of this family, and the medicinal value of plants lies in the chemical substances that produce a physiological change in the human body [2]. Therefore, in continuation of our research on bioactive molecules from the various species of different plant families [16–47], the aim of this study was to review the literature on the bioactivity of the genus Combretum.

Figure 1. The molecular structures of compounds isolated from Combretum species.

(A) Rhamnocitrin (R = R₂ = OH, R₁ = OMe, R₃ = H)
(B) Quercetin-5,3′-dimethylether
   (R = R₃ = OMe, R₁ = R₂ = OH)
(C) Rhamnazin (R = R₂ = OH, R₁ = R₃ = OMe)
(D) Genkwanin (R = R₂ = OH, R₁ = OMe)
(E) 5-Hydroxy-7,4′-dimethoxyflavone
   (R = OH, R₁ = R₂ = OMe)
2. Results and Discussion

In this review, it was possible to list thirty-six species of the genus *Combretum*. The effectiveness of the plant extracts depended on the type of drug studied and the bioassay models. Thus, it was possible to classify the extracts as active or inactive. In this study, we chose more species referenced in data collected in the NAPRALERT natural products database and the scientific literature databases ScienceDirect and PubMed.

*Combretum micranthum* is a bushy shrub or creeper found all over Africa. *C. micranthum* is used in traditional medicine for the treatment of wounds and sores [48–50] and of fever (especially malaria fever), cough and bronchitis [49,51]. In studies evaluating its antibacterial activity, the extracts used were obtained with different solvents (ethanol, chloroform, methanol or water). Activity was observed against the following bacterial species: *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Salmonella* species, *Streptococcus* species, *Proteus vulgaris*, *Klebsiella* species, *Sarcina lutea*, *Micrococcus luteus* and *Bacillus subtilis* [52–57]. In addition, antifungal activity against *Candida albicans* was noted [56]. Antiviral activity of a methanolic extract was reported against *Herpes simplex 1* and *Herpes simplex 2* [58]. Toxicity studies have reported the activity of an ethanolic extract in the brine shrimp lethality test [56]. Benoit et al. [59] and Karou et al. [60] reported anti-Malarial activity against *Plasmodium falciparum*. However, a methanolic extract did not display cytotoxic activity against THP1 cells [61] (Table 1).

Di Carlo et al. [62] demonstrated immuno-stimulating activity with a suspension of powdered leaf. Chika and Bello [63] demonstrated an antidiabetic effect for the aqueous leaf extract of *C. micranthum*. A dose of 100 mg/kg of the extract was the most effective, among the doses tested. It produced a significant hypoglycemic and antidiabetic activity comparable to the effect of a standard drug (0.6 mg/kg glibenclamide) (Table 1). This study demonstrated the potential antidiabetic
properties of aqueous leaf extract of *C. micranthum* for both type 1 and type 2 diabetes, justifying its traditional use in the treatment of this disease in Northwestern Nigeria. All of the above results contribute to justifying the use of the plant in traditional medicine for treating various conditions, particularly infections and diabetes.

*C. molle* (soft-leaved *Combretum*, velvet bush willow) is a tree with a larger, straighter trunk compared to most species of *Combretum*, further distinguished by its rough bark and dense crown. It occurs throughout tropical Africa and in the Arabian Peninsula in areas where woodlands and wooded grasslands predominate, often forming pure stands on hillsides [64].

*C. molle* has been widely used as a medicinal plant to treat various diseases such as parasitic, protozoan and other infectious diseases in East [65–67] and West Africa [68]. Antibacterial studies have demonstrated its activity against *Staphylococcus aureus* and *Helicobacter pylori* at different extract concentrations [69–71]. Antifungal activity was reported in models that used *Epidermodothyton floccosum*, *Microsporum gypseum*, *Trichophyton mentagrophytes*, *T. rubrum*, *Candida albicans*, *C. neoformans*, *Aspergillus fumigatus*, *Sporothrix schenckii* and *Microsporum canis* [72,73]. *C. molle* was also able to inhibit the growth of *Mycobacterium tuberculosis* [74]. Antitrypanosomal and anthelmintic activities of different extracts have also been reported [4,75–77] (Table 1).

Toxicity studies have reported the activity of aqueous and acetone extracts against *Artemia salina* [9]. Furthermore, Asres *et al.* [78] and Gansané *et al.* [6] reported antimalarial activity of the methanolic extract against *Plasmodium falciparum* at different concentrations tested. Molluscicidal effect of aqueous extract against *Biomphalaria pfeifferi* was also observed [75]. Meanwhile, embryotoxic effects have not been reported [79] (Table 1).

Methanolic extracts of the roots and leaves (25 μg/mL) of *C. molle* showed strong cytotoxic effects against T-24 bladder cancer cells [15]. In addition, the aqueous and methanol extracts of *C. molle* were screened for inhibitory effects against HIV-1 reverse transcriptase. These extracts produced relatively strong inhibition of RNA-dependent-DNA polymerase (RDDP) activity. The compounds responsible for these activities in this plant were not sought [80] (Table 1).

In the case of compounds obtained from *C. molle*, the analgesic and antiinflammatory properties of mollic acid glucoside (MAG) (Figure 1H), a 1α-hydroxycycloartenoid extracted from *Combretum molle* leaves, have been investigated in mice and rats [81]. The results of this laboratory animal study indicate that MAG possesses analgesic and antiinflammatory effects in the mammalian models used. The author suggested that MAG possesses both centrally- and peripherally-mediated analgesic effects.

Ojewole also reported on the cardiovascular effects of MAG. The results of this study showed that this compound was capable of causing bradycardia, vasorelaxation and hypotension in the animals evaluated [82]. In addition, hypoglycemic and antidiabetic activity have also been demonstrated [83].

*In vitro* anti-HIV activity of two isolated tannins from an acetone fraction, punicalgin (Figure 1F) and CM-A (whose structure has not yet been fully elucidated), was assessed against human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2). The results displayed selective inhibition of HIV-1 replication with selective indices (ratio of 50% cytotoxic concentration to 50% effective antiviral concentration) of 16 and 25, respectively and afforded complete cell protection against the virus-induced cytopathic effect when compared to control samples. Neither of the tannins was able to inhibit HIV-2 replication [84].
These results contribute to the validation of the popular use of this plant species in the treatment of bacterial, fungal, protozoan and viral infections and cardiovascular problems, among others. The plant *C. erythrophyllum* (Burch.) Sond., commonly known as river *Combretum*, is a medium-sized, spreading, densely foliaged tree up to 12 m in height, which has been used by traditional healers for a variety of disorders [85,86]. *C. erythrophyllum* is widely used in traditional medical practice in southern Africa. It has been used for treating abdominal pains and venereal diseases, which suggests the presence of antibacterial compounds in the leaves [87].

As part of the treatment for venereal diseases, powdered roots of *C. erythrophyllum* are inserted into the vagina, which has resulted in several fatalities. The same procedure is followed to reduce the size of the vaginal orifice. In addition, the plant has been used to treat sexually transmitted diseases [85].

Extracts of *C. erythrophyllum* obtained with different solvents (acetone, hexane, chloroform, carbon tetrachloride and butanol) have shown antibacterial activity at different doses against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Enterococcus faecalis* [88,89] (Table 1). Some antibacterial flavonoids were subsequently isolated by bioassay-guided fractionation, namely genkwanin (Figure 1D), 5-hydroxy-7,4-dimethoxyflavone (Figure 1E), rhamnocitrin (Figure 1A), quercetin-5,3-dimethylether (Figure 1B), and rhamnazin (Figure 1C). These compounds showed good activity against *Micrococcus luteus*, *Shigella sonnei*, *Vibrio cholerae*, *Enterococcus faecalis* and *Pseudomonas aeruginosa*. The results provide a clear rationale for the ethnomedicinal use of *C. erythrophyllum* leaves in treating bacterial infections [12]. Furthermore, these compounds have demonstrated antiinflammatory activity in experimental models *in vitro* [12].

Moreover, in studies evaluating antifungal activity, extracts obtained with different solvents (acetone, hexane, dichloromethane and methanol) were active against the following species: *C. albicans*, *C. neoformans*, *A. fumigatus*, *S. schenckii* and *M. canis* [73] (Table 1).

Toxicity studies have shown that the aqueous extract of *C. erythrophyllum* has mutagenic activity against *Salmonella typhimurium* [90]. The aqueous extract causes mutations in the meiotic stage of *Drosophila melanogaster* [86]. The methanol, dichloromethane and acetate extracts of *C. erythrophyllum* showed bioactivity in a yeast-based microtiter assay for DNA-damaging agents [91] (Table 1).

*C. erythrophyllum* extract has spasmolytic activity in the pre-contracted uterus, and this activity seems to involve the inhibition of cyclooxygenase, blocking the biosynthesis of prostaglandins, substances that are involved in uterine muscle contraction [92].

The alcoholic extract of *Combretum dolichopetalum* is used in folklore medicine to relieve stomach ache, blood in the stools, diarrhea, cramps and related gastrointestinal disorders [93]. The ethanolic extract of *C. dolichopetalum* has shown a gastroprotective effect in stress-induced and non-steroidal antiinflammatory (indomethacin)-induced ulcer models. The crude extract inhibited secretions induced in rats by pyloric ligation together with histamine [93,94] (Table 1). In addition, the pharmacological actions were evaluated in the guinea-pig isolated ileum and in intact rats. The crude extract inhibited the contractions induced by acetylcholine and histamine in the guinea-pig ileum in a concentration-dependent manner. The extract also delayed gastric emptying in rats in a dose-dependent manner. These results therefore suggest that *C. dolichopetalum* has gastric antisecretory activity, increasing gastric emptying time, and acts as a smooth muscle relaxant and spasmolytic agent [93,94] (Table 1).

The hepatoprotective effects of the ethanolic extract of *C. dolichopetalum* root bark were evaluated on paracetamol-induced liver intoxication in rats. Oral pre-treatment with *C. dolichopetalum* ethanolic
extract significantly attenuated the elevation of serum glutamate-oxaloacetate transaminase (GOT) and glutamate-pyruvate transaminase (GPT) induced by paracetamol intoxication in rats [95] (Table 1).

Asuzu et al. [94] demonstrated that the methanol and chloroform extracts obtained with dried roots of *C. dolichopetalum* have antiinflammatory activity in models of carrageenan-induced paw edema and croton oil-induced edema in mice [96]. Udem et al. conducted toxicity studies in rats and found activity in both sexes (LD$_{50}$ 246.0 mg/kg) [97] (Table 1).

*Combretum quadrangulare* is a shrub or tree, indigenous to southeast Asia, especially Burma to Laos. The plant is commonly known as “trâm bâu” (Vietnam), “kè khao” (Laos) or “sang kaê” (Cambodia), and the seeds are used in Vietnamese traditional medicine as a remedy against round and tapeworm infections in humans [98]. Studies conducted by Somanabandhu et al. [99] revealed the ether and ethanolic extracts of dried root bark or dried seed are effective against earthworms when tested *in vitro* [99]. Antimicrobial activity was also reported in extracts of dried leaves, which were active against *Helicobacter pylori* [100] (Table 1).

The hepatoprotective effect of MeOH, MeOH/H$_2$O (1:1) and aqueous extracts of *C. quadrangulare* seeds were examined on D-galactosamine (D-GalN)/tumor necrosis factor-α (TNF-α)-induced cell death in primary cultured mouse hepatocytes. The MeOH extract showed the strongest inhibitory effect on D-GalN/TNF-α-induced cell death (IC$_{50}$ 56.4 μg/mL). Moreover, the MeOH extract also significantly lowered the serum GPT level in mice with D-GalN/lipopolysaccharide (LPS)-induced liver injury [101] (Table 1). Acetone, MeOH, and aqueous extracts of *C. quadrangulare* were tested for their trypanocidal activity against epimastigotes of *Trypanosoma cruzi*, the causative agent of Chagas disease. Strong trypanocidal activity was found in the acetone extract of *C. quadrangulare* [102] (Table 1).

The aqueous and EtOH extracts of *C. quadrangulare* were screened for their inhibitory activity against HIV-1 integrase (IN), an enzyme essential for viral replication. The aqueous and EtOH extracts showed significant inhibitory activity against HIV-1 with an IC$_{50}$ value of 2.5 and 2.9 μg/mL, respectively [103] (Table 1). The compound O-galloyl-6-O-(4-hydroxy-3,5-dimethoxy)benzoyl-β-D-glucose (Figure 1G), a new gallic acid derivative isolated from *C. quadrangulare*, demonstrated potent hepatoprotective activity against D-GalN/TNF-alpha-induced cell death in primary cultured mouse hepatocytes [104]. The triterpenes of the lupane type, 2α,6β-dihydroxybetulonic acid (Figure 1I) and 6β-hydroxyhovenic acid (Figure 1J), isolated from the MeOH extract of *C. quadrangulare* seeds, also exhibited strong hepatoprotective activity [105].

3. Material and Methods

The biological activity of the *Combretum* species was searched through the NAPRALERT (acronym for Natural Products ALERT) databank of the University of Illinois at Chicago. The data were updated in April 2011, using biological activity of the *Combretum* species as search term. The plant extracts were selected for this work and the references found in the search were later consulted for details on the models or mechanisms. Furthermore, this data survey was supplemented with searches in the PubMed and ScienceDirect sites. The specific names of the species were used as keywords.
### Table 1. Bioactivities of drugs obtained of the genus botanical *Combretum*.

| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| *Enzymatic activity*<br>\(\text{Inhibition of acetylcholinesterase}\) | *C. hartmannianum*<br>Schweinf. | MeCl\(_2\) or AcOEt ext. of dried leaf | *In vitro*-TLC and Microplate assay by Ellman’s method | Inactive [106] |
| | | EtOH ext. of dried leaf | *In vitro*-TLC and Microplate assay by Ellman’s method-IC\(_{50}\) for drug: 0.25 mg/mL | Active [106] |
| | | MeCl\(_2\) and EtOH ext. of dried stem bark | *In vitro*-TLC and Microplate assay by Ellman’s method-IC\(_{50}\) for drugs: 1.0 or 0.37 mg/mL, respectively | Active [106] |
| | | AcOEt ext. of dried stem bark | *In vitro*-TLC and Microplate assay | Inactive [106] |
| | | EtOH ext. of dried root | *In vitro*-TLC and Micro-plate assay by Ellman’s method-IC\(_{50}\) for drug: 0.37 mg/mL | Active [106] |
| | | MeCl\(_2\) and AcOEt ext. of dried root | *In vitro*-TLC and Microplate assay by Ellman’s method | Inactive [106] |
| *Inhibition of ACE* | *C. fruticosum* (Loefl.)<br>Stuntz | MeOH/MeCl\(_2\) (50:50) ext. of dried stem or dried leaf | *In vitro*-ACE isolated from rabbit lung catalyze the cleavage of the chromophore-fluorophore-labeled substrate dansyltriglycine into dansylglycine—Concentration for drugs: 0.33 mg/mL | Active [107] |
| | | EtOH ext. of leaves | *In vitro*-ACE isolated from rabbit lung catalyze the cleavage of hippocryl-glycyl-glycine and react with trinitrobenzensulfonic acid to form 2,4,6-trinitrophenyl glycy glycine—Concentration for drug: 0.33 mg/mL | Active [108,109] |
Table 1. Cont.

| Biological Activity          | Botanical Name | Part Tested                                      | Bioassay Models                                      | Result          |
|------------------------------|----------------|--------------------------------------------------|------------------------------------------------------|-----------------|
| Inhibition of topoisomerase   | *C. apiculatum* Sond. subsp. *apiculatum* | EtOAc ext. of dried rootbark, or dried stemwood, or dried rootwood | In vitro-Topoisomerase I or topoisomerase II inhibition assay after Polyvinylpyrrolidine (1:1) or Collagen (1:100) methods, respectively | Active [110]    |
|                              | *C. erythrophyllum* (Burch.) Sond. | EtOAc ext. of dried leaf | In vitro-Topoisomerase I or topoisomerase II inhibition assay after Polyvinylpyrrolidine (1:1) or Collagen (1:100) methods, respectively | Active [110]    |
| Antiparasitic activity        |                |                                                  |                                                      |                 |
| Antiascariasis                | *C. quadrangulare* Kurz. | Ether and EtOH (95%) ext. of dried root bark or dried seed | In vitro-Earthworms—Concentration not cited | Active [99]    |
| Antifilariasis                | *C. mucronatum* Schumach. | Hot H₂O ext. of root | 88 human adult infected with guinea worms—Dose for drug: 0.03 mg/kg (p.o.) | Active [111]    |
| Anthelmintic                  | *C. apiculatum* Sond. subsp. *apiculatum* | H₂O, Acetone and AcOEt ext. of dried leaf | In vitro-Worms of *Caenorhabditis elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112]    |
|                              | *C. bracteosum* (Hochst.) Brandis ex Engl. | H₂O, Acetone and AcOEt ext. of dried leaf | In vitro-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112]  |
|                              | *C. celastroides* Welw ex Laws subsp. *celastroides* | H₂O, Acetone and AcOEt ext. of dried leaf | In vitro-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112]  |
|                              | *C. collinum* Fresen. subsp. *suluense* (Engl. & Diels) Okafor | H₂O and AcOEt ext. of dried leaf | In vitro-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112]  |
|                              |                | Acetone ext. of dried leaf | In vitro-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112]    |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|----------------|--------|
| *C. edwardsii* Exell | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 mg/mL | Inactive [112] |
|                      | Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 1 mg/mL | Active [112] |
| *C. erythrophyllum* (Burch.) Sond. | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 mg/mL | Inactive [112] |
|                      | Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 1 mg/mL | Active [112] |
| *C. hereroense* Schinz | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 mg/mL | Inactive [112] |
|                      | Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 1 mg/mL | Active [112] |
| *C. imberbe* Wawra | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                      | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 1 mg/mL | Active [112] |
| *C. kraussii* Hochst. | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                      | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 1 mg/mL | Active [112] |
| *C. microphyllum* Klotzsch | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                      | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112] |
| *C. mkuzense* Carr & Retief | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                      | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| *C. moggii* Exell   | *C. moggii* Exell | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
| *C. molle* R. Br. ex G. Don | *C. molle* R. Br. ex G. Don | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                     | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112] |
|                     | Acetone ext., n-butanol, hexane, CHCl₃ or H₂O/MeOH fractions of leaf | *In vitro*-Nematocidal activity by means of an egg hatch and larval development of *Haemonchus contortus*-Lethal Concentration 50% (LC₅₀) for drugs: 0.866, 0.333, 0.833, 0.747 or 0.065 mg/mL, respectively | Active [77] |
|                     | H₂O/MeOH ext. | Lambs infected with larvae of *H. contortus*—Dose for drug: 500, 1,000 or 2,000 mg/kg (*p.o.*) | Active [113] |
| *C. moseambicense* (Klotzsch) Engl. | *C. moseambicense* (Klotzsch) Engl. | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 mg/mL | Inactive [112] |
|                     | Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 1 mg/mL | Active [112] |
| *C. mucronatum* Schumach. | *C. mucronatum* Schumach. | Hot H₂O ext | Human adult infected with guinea worms—Dose not cited: (*p.o.*) | Active [114] |
| *C. nelsonii* Dümmer | *C. nelsonii* Dümmer | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                     | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112] |
## Table 1. Cont.

| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| Antileishmaniasis   |                |             |                 |        |
|                     | *C. comosum* G. Don. | MeOH, MeOH/H₂O (50:50) or MeCl₂ ext. of dried leaves | *In vitro*-Promastigotes of *Leishmania infantum*—Concentration for all drugs: >100.0 µg/mL | Inactive [116] |
|                     | *C. cuspidatum* Planch. ex Benth. | MeOH, MeOH/H₂O (50:50) or MeCl₂ ext. of dried leaves | *In vitro*-Promastigotes of *L. infantum*—Concentration for drugs: 34.5, >100.0 or 43.5 µg/mL, respectively | Inactive [116] |
|                     |                | MeOH, MeOH/H₂O (50:50) or MeCl₂ ext. of stem barks | *In vitro*-Promastigotes of *L. infantum*—Concentration for drugs: >100.0, >100.0 or 28.6 µg/mL, respectively | Inactive [116] |
|                     | *C. padoides* Engl. & Diels | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                     | *C. paniculatum* Vent. | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112] |
|                     |                | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                     | *C. petrophilum* Retief | H₂O and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                     |                | Acetone ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Active [112] |
|                     | *C. woodii* Dümmer | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
|                     | *C. zeyheri* Sond. | H₂O, Acetone and AcOEt ext. of dried leaf | *In vitro*-Worms of *C. elegans* var. Bristol—Concentration for drugs: 0.5 and 1 mg/mL | Inactive [112] |
| Biological Activity | Botanical Name                | Part Tested                          | Bioassay Models                                                                 | Result  |
|---------------------|------------------------------|--------------------------------------|---------------------------------------------------------------------------------|---------|
| Antimalarial        | *C. molle* R. Br. ex G. Don  | Acetone fraction of stem bark        | *In vitro*—Murine peritoneal macrophages infected with amastigotes of *L. donovani*—Concentration for drug: 30.0 μg/mL | Inactive [76] |
|                     | *C. micranthum* G. Don.      | EtOH (95%) ext. of dried leaf        | *In vitro*—Cell culture (erythrocytes) with parasite maturation of *Plasmodium falciparum*—IC₅₀ for drug: 33.05 μg/mL | Active [60] |
|                     |                              | MeOH ext. of dried leaf              | *In vitro*—Cell culture (*P. falciparum* W2)—Concentration for drug: >25 μg/mL | Inactive [61] |
|                     |                              | Decoction or infusion of dried leaf  | *In vitro*—Cell culture (*P. falciparum* FcB1-Colombia chloroquine resistant)—IC₅₀ for drug: 1.18 μg/mL | Active [59] |
|                     |                              | Infusion of dried leaf and stem      | *In vitro*—Cell culture (*P. falciparum* F32-Tanzania chloroquine-sensitive)—IC₅₀ for drug: 1.7 μg/mL | Active [59] |
|                     |                              | Decoction of dried leaf and stem     | *In vitro*—Cell culture (*P. falciparum* F32-Tanzania chloroquine-sensitive)—IC₅₀ for drug: 0.88 μg/mL | Active [59] |
|                     | *C. molle* R. Br. ex G. Don  | Acetone fraction of stem bark        | *In vitro*—Cell culture (Trophozoites of *P. falciparum*)—IC₅₀ for drug: 8.17 μg/mL | Active [76] |
|                     |                              | MeOH ext. of dried stem              | *In vitro*—Cell culture with *P. falciparum*—IC₅₀ for drug: 1.25 μg/mL          | Active [78] |
|                     |                              | EtOH (90%) ext. of leaves, root bark or stem bark | *In vitro*—Cell culture with *P. falciparum* K1—IC₅₀ for drugs: 4.0 μg/mL | Active [4] |
|                     |                              | MeOH or MeOH/H₂O ext. of leaves      | *In vitro*—Cell culture (K562S human monocyte infected with *P. falciparum* W2)—IC₅₀ for drugs: 5.7 or 7.9 μg/mL, respectively | Active [6] |
| *C. aff. psidioides* Welw. subsp. *psilophyllum* Wickens | EtOH (95%), Pet ether, EtOAc or H₂O ext. of dried root bark | *In vitro*—Microdilution assay (*P. falciparum*)—IC₅₀ for drugs: 31.0, 39.0, 6.5 or 30.0 μg/mL, respectively | Active [117] |
### Table 1. Cont.

| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| **Antischistosomal** | *C. racemosum* P. Beauv. | EtOH (90%) ext. of leaves or root bark | *In vitro*-Cell culture with *P. falciparum* K1—IC₅₀ for drug: 4.0 μg/mL | Active [4] |
| *C. zeyheri* Sond. | MeCl₂/MeOH (1:1) or H₂O ext. of twigs | *In vitro*—Microdilution assay (*P. falciparum* D10)—Concentration for drug: 15 or >100 μg/mL, respectively | Inactive [118] |
| *C. aculeatum* Vent. | H₂O ext. of dried leaf | *In vitro*—Miracidicidal and cercaricidal activity on *Schistosoma mansoni*—Concentration for drug: 1,000 ppm | Active [119] |
| *C. apiculatum* Sond. subsp. *apiculatum* | H₂O ext. of dried leaf | *In vitro*-Worms of *Schistosoma haematobium*—Concentration not cited | Inactive [112] |
| *C. bracteosum* (Hochst.) Brandis ex Engl. | H₂O ext. of dried leaf | *In vitro*-Worms of *S. haematobium*—Concentration not cited | Inactive [112] |
| *C. celastroides* Welw ex Laws subsp. *celastroides* | H₂O ext. of dried leaf | *In vitro*-Worms of *S. haematobium*—Concentration not cited | Inactive [112] |
| *C. celastroides* Welw ex Laws subsp. *celastroides* | H₂O ext. of dried leaf | *In vitro*-Worms of *S. mansoni*—Concentration for drug: 1,000 ppm | Active [119] |
| *C. bracteosum* (Hochst.) Brandis ex Engl. | H₂O ext. of dried leaf | *In vitro*-Worms of *S. haematobium*—Concentration not cited | Inactive [112] |
| *C. celastroides* Welw ex Laws subsp. *celastroides* | H₂O ext. of dried leaf | *In vitro*-Worms of *S. mansoni*—Concentration for drug: 1,000 ppm | Active [119] |
| *C. edwardsii* Exell | H₂O ext. of dried leaf | *In vitro*-Worms of *S. haematobium*—Concentration not cited | Inactive [112] |
| *C. erythrophyllum* (Burch.) Sond. | H₂O ext. of dried leaf | *In vitro*-Worms of *S. haematobium*—Concentration not cited | Inactive [112] |
| *C. glutinosum* Perrot. ex DC | H₂O ext. of dried leaf | *In vitro*-Miracidicidal and cercaricidal activity on *S. mansoni*—Concentration for drug: 1,000 ppm | Active [119] |
| *C. hartmannianum* Schweinf. | H₂O ext. of dried leaf | *In vitro*-Miracidicidal and cercaricidal activity on *S. mansoni*—Concentration for drug: 1,000 ppm | Active [119] |
| *C. hereroense* Schinz | H₂O ext. of dried leaf | *In vitro*-Worms of *S. haematobium*—Concentration not cited | Inactive [112] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| C. imberbe Wawra    | H₂O ext. of dried root or dried leaf | In vitro-Worms of S. haematobium—MIC for drugs: 25.0 or 12.5 mg/mL, respectively | Active [112,120] |
| C. kraussii Hochst. | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—MIC for drug: 12.5 mg/mL | Active [112] |
| C. microphyllum Klotzsch | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
| C. mkuzense Carr & Retief | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
| C. moggii Exell     | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
| C. molle R. Br. ex G. Don | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—MIC for drug: 25 mg/mL | Active [112] |
| C. mossambicense (Klotzsch) Engl. | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
| C. nelsonii Dümmer | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—MIC for drug: 12.5 mg/mL | Active [112] |
| C. padoides Engl. & Diels | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
| C. paniculatum Vent. | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—MIC for drug: 25 mg/mL | Active [112] |
| C. petrophilum Retief | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—MIC for drug: 25 mg/mL | Active [112] |
| C. woodii Dümmer    | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
| C. zeyheri Sond.    | H₂O ext. of dried leaf | In vitro-Worms of S. haematobium—Concentration not cited | Inactive [112] |
Table 1. Cont.

| Biological Activity       | Botanical Name       | Part Tested                  | Bioassay Models                                                                 | Result  |
|---------------------------|----------------------|------------------------------|---------------------------------------------------------------------------------|---------|
| Antitrypanosomal          | *C. dolichopetalum* Gils ex Engl. | EtOH (70%) ext. of dried root bark | Infection induced in rats (*Trypanosoma brucei* or *Trypanosoma congolense*)—Dose for drug: 80.0 mg/kg (i.p.) | Active [97] |
|                           | *C. molle* R. Br. ex G. Don | Acetone fraction of stem bark | *In vitro*—Murine peritoneal macrophages infected with *Trypanosoma cruzi*—Concentration for drug: >12.0 μg/mL | Inactive [76] |
|                           |                      | EtOH (90%) ext. of leaves, root bark or stem bark | *In vitro*—Blood stream form trypomastigotes of *T. brucei rhodesiense*—IC$_{50}$ for drug: 2.19 μg/mL | Active [76] |
|                           |                      | H$_2$O ext. of leaves | *In vitro*—Blood stream form trypomastigotes of *T. brucei rhodesiense*—Concentration for drugs: >25 μg/mL | Inactive [4] |
|                           | *C. quadrangulare* Kurz. | Acetone ext. of dried leaf | *In vitro*—Epimastigotes of *T. cruzi*—IC$_{50}$ for drug: 6.25 μg/mL | Active [102] |
|                           |                      | MeOH or H$_2$O ext. of dried leaf | *In vitro*—Epimastigotes of *T. cruzi*—Concentration for drugs: 100.0 μg/mL | Inactive [102] |
|                           | *C. racemosum* P. Beauv | EtOH (90%) ext. of leaves or of root bark | *In vitro*—Blood stream form trypomastigotes of *T. brucei rhodesiense*—Concentration for drugs: >25 μg/mL | Inactive [4] |
| Larvicidal-Dengue fever   | *C. aculeatum* Vent. | MeCl$_2$, MeOH and H$_2$O ext. of dried leaf or dried root bark | *In vitro*—Larvae of *Aedes aegypti*—Concentration for drugs: 500.0 μg/mL or 500.0 ppm | Inactive [122] |
|                           |                      | MeOH and H$_2$O ext. of dried stem | *In vitro*—Larvae of *A. aegypti*—Concentration for drugs: 500.0 ppm | Inactive [122] |
|                           | *C. collinum* Fresen. | Ether ext. of shoot bark | *In vitro*—Larvae of *A. aegypti*—Concentration for drug: 0.0125–0.200 mg/mL | Active [123] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|---------------|-------------|-----------------|--------|
| **Antimicrobial activity** | | | | |
| **Antibacterial** | | | | |

- **C. apiculatum** Sond. ssp. apiculatum
  - Hexane ext. of dried leaf
  - Microdilution assay (*Bacillus subtilis, Escherichia coli, Staphylococcus aureus* or *Klebsiella pneumoniae*)—Maximum concentration for drug: 12.5 mg/mL
  - Inactive [65]

- **EtOH ext. of dried leaf**
  - Microdilution assay (*B. subtilis* or *S. aureus* with MIC for drug: 0.049 mg/mL)
  - Microdilution assay (*K. pneumonia* or *E. coli*)—Maximum concentration for drug: 12.5 mg/mL
  - Inactive [65]

- **H₂O ext. of dried leaf**
  - Microdilution assay (*B. subtilis* or *S. aureus* with MIC for drug: 0.39 mg/mL)
  - Microdilution assay (*K. pneumonia* or *E. coli*)—Maximum concentration for drug: 12.5 mg/mL
  - Inactive [65]

- **C. bracteatum** (Laws.) Engl. et Diels
  - EtOH (40%) or H₂O ext. of dried stem
  - Agar diffusion method (*E. coli, Nisseria gonorrhoeae, S. aureus, Streptococcus sp, Salmonella typhimurium, B. subtilis, Bacteroides melaninogenicus, Clostridium tetani, Proteus vulgaris, Pseudomonas pyocyanea, Shgella dysenteriae or Yersinia enterocolita*)—Concentration for drugs: 0.33 g/mL
  - Inactive [124]

- **EtOH (40%) ext. of dried stem**
  - Agar diffusion method (*K. pneumoniae* or *Bacteroides fragilis*)—Concentration for drugs: 0.33 g/mL with 5–9 mm diameter zone of inhibition
  - Active [124]
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
|                     | *C. collinum* Fresen. | H₂O ext. of dried stem | Agar diffusion method (C. diphtheriae)—Concentration for drug: 0.33 g/mL with 5–9 mm diameter zone of inhibition | Active [124] |
|                     | *C. collinum* Fresen. | MeOH, EtOH or MeOH-H₂O ext. of dried air parts | Agar diffusion method with diameters inhibition zones (Pseudomonas aeruginosa)—Concentration for drugs: 1 and 5 mg/mL with inhibition of 9 mm | Inactive [57] |
|                     | *C. comosum* G. Don. | Hot H₂O ext. of dried root bark | Agar diffusion method with diameters inhibition zones (Mycobacterium phlei, Sarcina lutea or S. aureus)—Concentration not cited. | Active [52] |
|                     | *C. erythrophyllum* (Burch.) Sond. | Acetone ext. of dried leaf | Microdilution assay—(S. aureus, P. aeruginosa, Enterococcus faecalis or E. coli)—IC₅₀ for drug: 1.50, 1.50, 1.50 or 0.8 mg/mL, respectively | Active [89] |
|                     | *C. erythrophyllum* (Burch.) Sond. | Acetone, EtOH (100%), CHCl₃/MeOH/H₂O (12:5:3), H₂O, MeCl₂ or MeOH ext. of dried leaf | Dilution and bioautographic TLC system assay (S. aureus)—Concentration for drugs: 0.1 g/mL | Active [125] |
|                     | *C. erythrophyllum* (Burch.) Sond. | CHCl₃ or CCl₄ ext. of freeze-dried leaf | Microdilution assays [(S. aureus, MIC for drugs: 0.1 or 1.6 mg/mL, respectively), (E. faecalis, MIC for drugs: 0.2 or 1.6 mg/mL, respectively), (E. coli, MIC for drugs: 3.1 or 12.5 mg/mL, respectively) and (P. aeruginosa, MIC for drugs: 3.1 or 25.0 mg/mL, respectively)] | Active [88] |
Table 1. Cont.

| Biological Activity | Botanical Name                  | Part Tested                        | Bioassay Models                                                                                       | Result   |
|---------------------|---------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------|----------|
|                     |                                 | H₂O or MeOH/H₂O (2:1) ext. of freeze-dried leaf | Microdilution assays [(S. aureus, MIC for drugs: 0.2 or 0.05 mg/mL, respectively), (E. faecalis, MIC for drugs: 0.4 mg/mL), (E. coli, MIC for drugs: 1.6 or 6.3 mg/mL, respectively), (P. aeruginosa, MIC for drugs: 6.3 or 12.5 mg/mL, respectively)] | Active [88] |
|                     |                                 | Butanol or Hexane ext. of freeze-dried leaf | Microdilution assays [(S. aureus, MIC for drugs: 0.4 or 50 mg/mL, respectively), (E. faecalis, MIC for drugs: 0.2 or 1.6 mg/mL, respectively), (E. coli, MIC for drugs: 25 or 0.8 mg/mL, respectively), (P. aeruginosa (MIC for drugs: 12.5 or 1.6 mg/mL, respectively)] | Active [88] |
|                     |                                 | CHCl₃ fraction of leaves             | Serial dilution microplate assay (Micrococcus luteus, Shigella sonnei, Vibrio cholera or E. faecalis—MIC for drug: 50, 25, 50 or 50 μg/mL, respectively) | Active [12] |
|                     | C. glutinosum Perrot. ex DC.     | MeOH ext. of dried leaf             | Agar diffusion method (S. lutea and E. coli — Concentration for drug: 15.0 and 10.0 mg/mL, respectively) | Active [53] |
|                     | C. hartmannianum Schweinf.       | MeCl₂, EtOAc or EtOH ext. of dried leaf | Microdilution assay (B. subtilis)—MIC for drugs: <0.1, 0.39 or 0.2 mg/mL, respectively Microdilution assay (K. pneumonia)—MIC for drugs: 0.2, 0.78 or 0.39 mg/mL, respectively Microdilution assay (S. aureus)—MIC for drugs: 1.56, 1.56 or 0.2 mg/mL, respectively Microdilution assay (E. coli)—MIC for drugs: 1.56, 1.56 or 0.39 mg/mL, respectively | Active [106] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|----------------|--------|
| MeCl₂, EtOAc or EtOH ext. of dried bark | Microdilution assay (K. pneumonia) — MIC for drugs: 0.39, 0.78 or 0.78 mg/mL, respectively | Active [106] |
|                     | Microdilution assay (Staphylococcus aureus) — MIC for all drugs: 3.13 mg/mL | Active [106] |
|                     | Microdilution assay (E. coli) — MIC for drugs: 3.13, 3.13 or 1.56 mg/mL, respectively | Active [106] |
|                     | Microdilution assay (B. subtilis) — MIC for drugs: 3.13, 0.39 or 1.56 mg/mL, respectively | Active [106] |
|                     | Microdilution assay (K. pneumonia) — MIC for drugs: 0.78, 0.78 or 0.2 mg/mL, respectively | Active [106] |
|                     | Microdilution assay (B. subtilis) — MIC for drugs: 0.1, 0.39 or 0.39 mg/mL, respectively | Active [106] |
|                     | Microdilution assay (S. aureus) — MIC for all drugs: 3.13, 3.13 or 0.2 mg/mL, respectively | Active [106] |
|                     | Microdilution assay (E. coli) — MIC for drugs: 3.13, 3.13 or 0.2 mg/mL, respectively | Active [106] |
|                     | Broth microdilution method (Mycobacterium aurum A+) — MIC for drugs: 0.78, 3.12 or 0.19 mg/mL, respectively | Active [126] |
|                     | Broth microdilution method (M. aurum A+) — MIC for drugs: 12.5, 25 or 1.56 mg/mL, respectively | Active [126] |
|                     | Broth microdilution method (M. aurum A+) — MIC for drugs: 3.12 or 12.5 mg/mL, respectively | Active [126] |
|                     | Broth microdilution method (M. aurum A+) — Concentration for drug: 25 mg/mL | Active [126] |
|                     | Broth microdilution method (M. aurum A+) — Concentration for drug: 3.12 or 12.5 mg/mL, respectively | Active [126] |
|                     | Microplate serial dilution method (S. aureus) — Concentration for drug: 39 μg/mL | Active [127] |

**C. imberbe** Wawra

| Part Tested | Microdilution assay (K. pneumonia) — MIC for drugs: 0.39, 0.78 or 0.78 mg/mL, respectively |
|-------------|----------------------------------------------------------|
| MeCl₂ or EtOH ext. of dried root | Active [106] |
| EtOAc ext. of dried root | Active [106] |
| MeCl₂ ext. of dried leaves | Active [127] |
### Table 1. Cont.

| Biological Activity | Botanical Name       | Part Tested           | Bioassay Models                                                                                     | Result     |
|---------------------|----------------------|-----------------------|------------------------------------------------------------------------------------------------------|------------|
|                     | *C. micranthum* G. Don | Hot H₂O ext. of dried root | Agar diffusion method (*Mycobacterium phlei*)—Concentration not cited.                               | Inactive [52] |
|                     |                      | MeOH, EtOH or MeOH-H₂O ext. of dried air parts | Agar diffusion method with diameters inhibition zones (*P. aeruginosa*)—Concentration for drugs: 1 and 5 mg/mL with inhibition zone of 9 or 8 mm | Active [57] |
|                     |                      |                       | Agar diffusion method with diameters inhibition zones (*S. pyogenes, L. monocytogenes*)—Concentration for drugs: 1 mg/mL | Inactive [57] |
|                     |                      |                       | Agar diffusion method with diameters inhibition zones (*E. coli, K. pneumoniae, C. freundii or B. subtilis*)—Concentration for drugs: 1 and 5 mg/mL | Inactive [57] |
|                     |                      |                       | Agar diffusion method with diameters inhibition zones or microdilution assay (*S. aureus*)—Concentration for drugs: 1 and 5 mg/mL with inhibition zone of 10 mm, or MIC for drugs: 0.5 µg/mL | Active [57] |
|                     | EtOH (95%) ext. of dried twigs |                       | Agar diffusion method with diameters inhibition zones (*B. subtilis* or *S. aureus*)—Concentration for drug: 50 mg/mL with inhibition zone > 15 mm or 5 mg/mL with inhibition zone > 15 mm | Active [49] |
|                     | EtOH (100%) ext. of dried leaf |                       | Microplate serial dilution method [*Salmonella* sp, *Streptococcus* sp, *P. vulgaris*, *S. aureus*, *E. coli*, *P. aeruginosa* or *Klebsiella* sp—MIC for drug: 1.0 mg/mL] | Active [56] |
|                     | CHCl₃ ext. of dried leaf |                       | Microplate serial dilution method [*Salmonella* sp, *E. coli, P. aeruginosa*, *Klebsiella* sp—Concentration for drug: 1.0 mg/mL] | Inactive [56] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|---------------|-------------|-----------------|--------|
|                     |               | H$_2$O ext. of dried leaf | Microplate serial dilution method [Streptococcus sp, P. vulgaris or S. aureus—MIC for drug: 1.0 mg/mL] | Active [56] |
|                     |               | H$_2$O ext. of dried leaf | Microplate serial dilution method [Salmonella sp, P. aeruginosa or S. aureus—MIC for drug: 1.0 mg/mL] | Active [56] |
|                     |               | MeOH ext. of dried leaf | Microplate serial dilution method [E. coli, Klebsiella sp, Streptococcus sp. or P. vulgaris—Concentration for drug: 1.0 mg/mL] | Inactive [56] |
|                     |               | Hot H$_2$O ext. of dried root | Microplate serial dilution method [S. lutea or E. coli)—MIC for drug: 10.0 mg/mL | Active [53] |
|                     |               | H$_2$O ext. of dried root | Microplate serial dilution method [S. lutea or S. aureus]—Concentration not cited. | Active [52] |
|                     |               | Decoction of dried root | Microplate serial dilution method [C. diphtheria)—MIC for drug: 5.0 mg/mL | Active [55] |
|                     |               | Decoction or H$_2$O ext. of dried root | Microplate serial dilution method (Serratia marcescens or Salmonella typhosa)—MIC for drug: 5.0 or 3.0 mg/mL, respectively | Active [55] |
|                     |               | Decoction or H$_2$O ext. of dried root | Microplate serial dilution method (K. pneumonia (MIC 5.0 mg/mL or 7.0 mg/mL, respectively); S. aureus (MIC 1.0 mg/mL or 2.0 mg/mL, respectively)] | Active [55] |
| Biological Activity | Botanical Name          | Part Tested                      | Bioassay Models                                                                 | Result  |
|---------------------|------------------------|----------------------------------|---------------------------------------------------------------------------------|---------|
| H₂O ext. of dried root | *C. molle* R.Br. ex G. Don. | Acetone and H₂O ext. of dried bark | *In vitro*-Radiometric method (*M. tuberculosis*)—MIC for drugs: 1.0 mg/mL. | Active [74] |
|                     |                        | Acetone fraction of dried stem bark | *M. tuberculosis typus humanus)—Concentration for drug: 1.0–2 mg/mL.            | Inactive [128] |
| Decoction or H₂O ext. of dried root |                        | MeOH ext. of dried bark          | Microdilution method (*Streptococcus mutans or Actinomyces viscosus*)—MIC for drug: 5.0 mg/mL | Active [129] |
| EtOH (100%) ext. of dried stembark |                        | Acetone ext. of dried leaf        | Microdilution method (*S. aureus*)—MIC for drug: 0.07 mg/mL.                  | Active [69] |
|                     |                        | Acetone ext. of dried stembark    | Agar diffusion method (*S. aureus*)—Concentration for drug: 1.0 mg/mL.         | Active [128] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| MeOH ext. of dried wood | | Agar diffusion method ($S. mutans$)—Concentration for drug: 5.0 mg/disc | Inactive [129] |
| | | Agar diffusion method ($A. viscosus$)—Concentration for drug: 5.0 mg/disc | Active [129] |
| Acetone ext. of stem bark | | Agar diffusion and micro broth dilution methods ($Helicobacter pylori$)—Concentration for drug: 100 mg/mL with inhibition zone of 10–38 mm, and MIC for drug: 0.08–2.50 mg/mL | Active [71] |
| EtOH or MeOH ext. of stem bark | | Agar diffusion method and micro broth dilution methods ($H. pylori$)—Concentration for drug: 100 mg/mL with inhibition zone of 7–35 or 7–32 mm | Active [71] |
| AcOEt or $H_2$O ext. of stem bark | | Agar diffusion and micro broth dilution methods ($H. pylori$)—Concentration for drug: 100 mg/mL with inhibition zone of 0–21 or 0–20 mm | Active [71] |
| EtOH ext. of stem bark | | Agar dilution method ($Bacillus cereus$ or $S. aureus$)—MIC for drug: 250 μg/mL | Active [70] |
| MeOH ext. of dried root | | Plate-hole diffusion and broth microdilution ($S. aureus$)—MIC for drug: 1 mg/mL | Active [130] |
| | | Plate-hole diffusion and broth microdilution ($S. epidermidis$)—Concentration for drug: 1 mg/mL | Inactive [130] |
| $H_2$O ext. of dried root | | Plate-hole diffusion and broth microdilution ($S. epidermidis$ or $S. aureus$)—Concentration for drug: 1 mg/mL | Inactive [130] |
| EtOH ext. of dried seed or stem | | Agar plate with diameters inhibition zones—$S. aureus$—Concentration for drugs: 100 or 50 mg/mL with inhibition zone of 5 mm | Active [131] |
| Biological Activity | Botanical Name                  | Part Tested                          | Bioassay Models                                                                 | Result      |
|---------------------|--------------------------------|--------------------------------------|--------------------------------------------------------------------------------|-------------|
|                     | EtOH ext. of dried bark or leaf | Agar plate with diameters inhibition zones—  
S. aureus—Concentration for drugs:  
3–100 mg/mL with inhibition zone of 20 mm | Active [131]                             |             |
|                     | EtOH ext. of dried leaf         | Agar plate with diameters inhibition zones—  
S. agalactiae—Concentration for drug: 50 mg/mL with inhibition zone of 20 mm | Active [131]                             |             |
|                     | C. paniculatum Vent.            | EtOH (80%) ext. of dried leaf        | Microdilution method (*M. tuberculosis*)—  
Concentration for drug: 2 mg/mL | Inactive [128] |             |
|                     | Acid-EtOH ext. of dried leaf    | Agar plate well-diffusion method (*S. aureus,  
Salmonella gallinarum, E. coli, P. vulgaris,  
P. aeruginosa, K. pneumonia*)—Concentration for drug: 0.20 mL/disc (1,000 µg/mL) | Active [132]                             |             |
|                     | H₂O ext. of dried leaf          | Agar plate well-diffusion method (*S. aureus,  
E. coli, P. vulgaris or K. pneumonia*)—  
Concentration for drug: 0.20 mL/disc (1,000 µg/mL)  
Agar plate well-diffusion method (*S. gallinarum  
or P. aeruginosa*)—Concentration for drug: 0.20 mL/disc (1,000 µg/mL) | Active [132] | Inactive [132] |
|                     | MeOH ext. of dried root         | Plate-hole diffusion and broth microdilution—  
*S. epidermidis* (MIC for drug: 2.77 mg/mL) or  
*S. aureus* (MIC for drug: 1.85 mg/mL) | Active [130]                             |             |
|                     | H₂O ext. of dried root          | Plate-hole diffusion and broth microdilution—  
*S. epidermidis* or *S. aureus* (MIC for drug:  
14.44 mg/mL) | Active [130]                             |             |
|                     | C. quadrangulare Kurz.          | MeOH or H₂O ext. of dried leaf       | Agar plate well-diffusion method (*H. pylori*)—Concentration not cited | Active [100] |             |
|                     |                               | EtOH (95%) ext. of dried seed or dried root | Agar plate well-diffusion method (several gram + organisms) —Concentration not cited | Active [99]  |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| *C. racemosum* P. Beauv. | EtOH (40%) or H₂O ext. of dried petiole and leaves | Agar plate diffusion method (*E. coli, N. gonorrheae, Streptococcus* sp, *B. subtilis, P. vulgaris, P. pyocyanea, K. pneumoniae, B. fragilis, Y. enterocolita or S. typhimurium*)—Concentration for drugs: 0.33 g/mL | Inactive [124] |
| | EtOH (40%) ext. of dried petiole and leaves | Agar plate diffusion method (*S. aureus*)—Concentration for drugs: 0.33 g/mL with ≥ 20 mm diameter zone of inhibition | Active [124] |
| | EtOH (40%) ext. of dried leaf and stem | Agar plate diffusion method (*C. diphtheria, B. melaninogenicus or S. dysenteriae*)—Concentration for drugs: 0.33 g/mL with ≥ 20 mm diameter zone of inhibition | Active [124] |
| | H₂O ext. of dried petiole and leaves | Agar plate diffusion method (*C. tetani*)—Concentration for drugs: 0.33 g/mL with 10–19 mm diameter zone of inhibition | Inactive [124] |
| *C. raimbaultii* Heckel | EtOH/H₂O (1:1) ext. | Agar plate diffusion method (*E. coli or S. aureus*)—Concentration not cited | Active [133] |
| | | Agar plate diffusion method (*B. anthracis*)—Concentration not cited | Inactive [133] |
| *C. zeyheri* Sond. | H₂O ext. of fresh entire plant | Agar plate diffusion method (*N. gonorrhea*)—Concentration for drugs: 1.0 mg/mL | Inactive [134] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|----------------|--------|
| Antifungal          | *C. aculeatum* Vent. | CHCl<sub>3</sub>, MeOH or H<sub>2</sub>O ext. of dried leaf or dried stem | Agar plate diffusion method (*Candida albicans*)—Concentration not cited | Active [135] |
|                     |                 | MeOH, H<sub>2</sub>O or CHCl<sub>3</sub> ext. of dried leaf or dried stem | Agar plate diffusion method (*Aspergillus niger*)—Concentration for drugs: 1 mg/mL | Active [135] |
|                     |                 | MeCl<sub>2</sub>, MeOH or H<sub>2</sub>O ext. of dried leaf, dried root bark or dried stem | Agar plate diffusion method (*Cladosporium cucumerinum*)—Concentration for drugs: 100.0 μg/plate | Inactive [122] |
|                     | *C. acutifolium* Exell | Acetone, Hexane, MeCl<sub>2</sub> or MeOH ext. of dried leaf | Microdilution assay [*C. albicans*—MIC for drugs: 0.16, 2.5, 2.5 or 0.04 mg/mL, respectively; *Criptococcus neoformans*—MIC for drugs: 0.04, 0.16, 0.16 or 0.08 mg/mL, respectively] | Active [73] |
|                     |                 |             | Microdilution assay [*Aspergillus fumigates*—MIC for drugs: 0.08, 2.5, 0.16 or 0.16 mg/mL, respectively; *Sporothrix schenckii*—MIC for drugs: 0.04, 0.32, 0.32 or 0.08 mg/mL, respectively; *Microsporum canis*—MIC for all drugs: 0.02 mg/mL] | Active [73] |
|                     | *C. apiculatum* Sond. ssp. *apiculatum* | Acetone, Hexane, MeCl<sub>2</sub> or MeOH ext. of dried leaf | Microdilution assay [*A. fumigates*—MIC for all drugs: 2.5 mg/mL; *M. canis*—MIC for all drugs: 0.02 mg/mL] | Active [73] |
|                     |                 |             | Microdilution assay [*S. schenckii*—MIC for drugs: 0.02, 0.04, 0.02 or 0.02 mg/mL, respectively; *C. neoformans*—MIC for drugs: 0.08, 2.5, 0.08 or 0.08 mg/mL, respectively] | Active [73] |
|                     |                 |             | Microdilution assay (*C. albicans*)—MIC for drugs: 0.32, 1.25, 0.32 or 0.32 mg/mL, respectively | Active [73] |
### Table 1. Cont.

| Biological Activity | Botanical Name                          | Part Tested                           | Bioassay Models                                                                 | Result          |
|---------------------|-----------------------------------------|---------------------------------------|---------------------------------------------------------------------------------|-----------------|
|                     | *C. albopuctatum*                        | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 0.64, 2.5, 0.32 or 0.32 mg/mL, respectively<br>Microdilution assay (*C. neoformans*)—MIC for drugs: 0.08, 0.08, 0.16 or 0.16 mg/mL, respectively<br>Microdilution assay (*A. fumigates*)—MIC for drugs: 0.08, 0.64, 0.16 or 0.32 mg/mL, respectively<br>Microdilution assay (*S. schenckii*)—MIC for all drugs: 0.02 mg/mL | Active [73]      |
|                     | *C. bracteosum* (Hochst.) Brandis ex Engl. | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 1.25, 2.5, 2.5 or 1.25 mg/mL, respectively<br>Microdilution assay (*C. neoformans*)—MIC for drugs: 0.32, 0.32, 0.16 or 0.32 mg/mL, respectively<br>Microdilution assay (*A. fumigates*)—MIC for all drugs: 2.5 mg/mL<br>Microdilution assay (*S. schenckii*)—MIC for drugs: 0.16, 0.08, 0.16 or 0.16 mg/mL, respectively; *M. canis*—MIC for all drugs: 0.02 mg/mL | Active [73]      |
|                     | *C. caffrum*                            | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: >2.5, 0.16, 0.64 or >2.5 mg/mL, respectively<br>Microdilution assay (*C. neoformans*)—MIC for drugs: 0.32, 0.32, 0.16 or 0.32 mg/mL, respectively | Active [73]      |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| Microdilution assay (A. fumigates)—MIC for drugs: >2.5, 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (S. schenckii)—MIC for drugs: 0.64, 0.64, 0.64 or 0.32 mg/mL, respectively | Active [73] |
| Microdilution assay (M. canis)—MIC for drugs: 0.08, 0.32, 0.32 or 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (C. albicans)—MIC for drugs: 0.16, 0.64, 0.32, 0.64 mg/mL, respectively | Active [73] |
| Microdilution assay (C. neoformans)—MIC for drugs: 0.16, 0.16, 0.08 or 0.32 mg/mL, respectively | Active [73] |
| Microdilution assay (A. fumigates)—MIC for drugs: 0.64, >2.5, 1.25 or 0.64 mg/mL, respectively | Active [73] |
| Microdilution assay (S. schenckii)—MIC for drugs: 0.32, 0.32, 0.16 or 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (M. canis)—MIC for drugs: 0.32, 0.64, 0.64 or 0.08 mg/mL, respectively | Active [73] |
| Microdilution assay (C. albicans)—MIC for drugs: 0.16, 0.32, 0.16 or 0.32 mg/mL, respectively | Active [73] |
| Microdilution assay (C. neoformans)—MIC for drugs: 0.08, 0.32, 0.08 or 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (A. fumigates)—MIC for drugs: 0.32, 2.5, 2.5 or 2.5 mg/mL, respectively | Active [73] |
| Microdilution assay (S. schenckii)—MIC for drugs: 0.08, 0.16, 0.16 or 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (M. canis)—MIC for drugs: 0.04, 0.32, 0.32 or 0.08 mg/mL, respectively | Active [73] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|---------------|-------------|----------------|--------|
| C. collinum Fresen. subsp. suluense Okafor | MeOH ext. of dried root | MeOH, EtOH or MeOH-H₂O ext. of dried air parts | | |
| | | | Agar plate diffusion method-(C. albicans or A. niger)—Concentration for drug: 1.0 mg/mL | Active [57] |
| | | | Agar plate with diameters inhibition zones (C. albicans or A. niger)—Concentration for drugs: 5 mg/mL with inhibition zone of 10 or 14 mm, respectively | Active [57] |
| | | | Agar plate with diameters inhibition zones (C. albicans or A. niger)—Concentration for drugs: 1 mg/mL | Inactive [57] |
| | | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (C. albicans)—MIC for drugs: 0.08, 2.5, 0.08 or 0.16 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (C. neoformans)—MIC for drugs: 0.16, 2.5, 0.08 or 0.08 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (A. fumigates)—MIC for all drugs: 2.5 mg/mL | Active [73] |
| | | | Microdilution assay (S. schenckii)—MIC for drugs: 0.16, 2.5, 0.16 or 0.32 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (M. canis)—MIC for drugs: 0.64, 1.25, 0.64 or 0.32 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (C. albicans)—MIC for all drugs: 0.64 mg/mL | Active [73] |
| | | | Microdilution assay (C. neoformans)—MIC for drugs: 0.08, 0.16, 0.32 or 0.32 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (A. fumigates)—MIC for drugs: 0.64, 2.5, 2.5 or 2.5 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (S. schenckii)—MIC for drugs: 0.64, 0.32, 0.32 or 0.64 mg/mL, respectively | Active [73] |
| | | | Microdilution assay (M. canis)—MIC for drugs: 0.32, 1.25, 0.64 or 0.16 mg/mL, respectively | Active [73] |
Table 1. Cont.

| Biological Activity | Botanical Name          | Part Tested                          | Bioassay Models                                                                 | Result        |
|---------------------|-------------------------|--------------------------------------|--------------------------------------------------------------------------------|---------------|
| C. conosum G. Don.  | Hot H2O ext. of dried root | Agar plate diffusion method (*Saccharomyces cerevisiae* or *A. niger*)—Concentration not cited | Inactive [52] |
| C. edwardsii Exell  | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 0.32, 1.25, 1.25 or 0.64 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*C. neoformans*)—MIC for drugs: 0.04, 0.32, 0.32 or 0.16 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*A. fumigates*)—MIC for drugs: 2.5, 2.5, 2.5 or 2.5 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*S. schenckii*)—MIC for drugs: 0.04, 0.08, 0.08 or 0.04 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*M. canis*)—MIC for drugs: 0.04, 0.02, 0.04 or 0.04 mg/mL, respectively | Active [73]  |
| C. erythrophyllum   | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: >2.5, 0.64, 0.64 or 2.5 mg/mL, respectively | Active [73]  |
| (Burch.) Sond.      |                         | Microdilution assay (*C. neoformans*)—MIC for drugs: 2.5, 0.64, 0.32 or 0.64 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*A. fumigates*)—MIC for drugs: 2.5, >2.5, >2.5 or 2.5 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*S. schenckii*)—MIC for drugs: >2.5, 0.32, 0.32 or 1.25 mg/mL, respectively | Active [73]  |
|                     |                         | Microdilution assay (*M. canis*)—MIC for drugs: 0.02, 1.25, 0.32 or 0.16 mg/mL, respectively | Active [73]  |
| C. glutinosum       | EtOH/H₂O (1:1) ext. of dried leaf | Microdilution assay (*C. albicans*, *Epidermophyton floccosum*, *M. gypseum*, *Trichophyton mentagrophytes* or *Trichophyton rubrum*)—MIC for drug: >4.0, 4.0, 1.0, 1.0 or 1.0 mg/mL, respectively | Active [72]  |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| *C. hereroense* Schinz | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 0.32, 0.32, 2.5 or 0.04, respectively | Active [73] |
|                     |                |             | Microdilution assay (*C. neoformans*)—MIC for drugs: 0.16, 0.08, 0.32 or 0.08 mg/mL, respectively |         |
|                     |                |             | Microdilution assay (*A. fumigates*)—MIC for drugs: 2.5, 2.5, 2.5 or 1.25 mg/mL, respectively |         |
|                     |                |             | Microdilution assay (*S. schenckii*)—MIC for drugs: 0.16, 0.16, 0.32 or 0.16 mg/mL, respectively |         |
|                     |                |             | Microdilution assay (*M. canis*)—MIC for drugs: 0.04, 0.02, 0.02 or 0.04 mg/mL, respectively |         |
| *C. hispidum* Laws. | EtOH-H₂O (1:1) ext. of dried leaf | Microdilution assay (*C. albicans, E. floccosum, M. gypseum, T. mentagrophytes or T. rubrum*)—MIC for drug: >4.0, >4.0, >4.0, 4.0 or 4.0 mg/mL, respectively | Active [72] |
| *C. imberbe* Wawra | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 2.5, 0.16, 0.16 or >2.5 mg/mL, respectively | Active [73] |
|                     |                |             | Microdilution assay (*C. neoformans*)—MIC for drugs: 0.16, 0.16, 0.32 or 0.32 mg/mL, respectively |         |
|                     |                |             | Microdilution assay (*A. fumigates*)—MIC for drugs: 2.5 mg/mL, respectively |         |
|                     |                |             | Microdilution assay (*S. schenckii*)—MIC for drugs: 2.5, >2.5, 0.32 or >2.5 mg/mL, respectively |         |
|                     |                |             | Microdilution assay (*M. canis*)—MIC for drugs: 0.32, 0.64, 0.16 or 0.32 mg/mL, respectively |         |
Table 1. Cont.

| Biological Activity | Botanical Name         | Part Tested                               | Bioassay Models                                                                 | Result          |
|---------------------|------------------------|-------------------------------------------|---------------------------------------------------------------------------------|-----------------|
|                     | *C. kraussii* Hochst.  | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 2.5, 0.08, 0.32 or 1.25 mg/mL, respectively<br>Microdilution assay (*C. neoformans*)—MIC for drugs: 0.64, 0.32, 0.16 or 0.32 mg/mL, respectively<br>Microdilution assay (*A. fumigates*)—MIC for drugs: 0.64, 2.5, 2.5 or 0.16 mg/mL, respectively<br>Microdilution assay (*S. schenckii*)—MIC for drugs: 0.64, 0.32, 0.32 or 0.64 mg/mL, respectively | Active [73]     |
|                     | *C. micranthum* G. Don | MeOH, EtOH or MeOH-H₂O ext. of dried air parts | Agar plate with diameters inhibition zones (*C. albicans*)—Concentraton for drugs: 5 mg/mL with inhibition zone of 11 mm<br>Agar plate with diameters inhibition zones (*C. albicans*)—Concentraton for drugs: 1 mg/mL<br>Agar plate with diameters inhibition zones (*A. niger*)—Concentraton for drugs: 1 or 5 mg/mL<br>Agar plate with diameters inhibition zones (*A. niger*)—Concentraton for drug: 50 or 5 mg/mL | Active [57]     |
|                     |                        | EtOH (95%) ext. of dried twigs             | Agar plate with diameters inhibition zones (*A. niger*)—Concentraton for drug: 50 or 5 mg/mL | Inactive [49]   |
|                     |                        | Hot H₂O ext. of dried root                 | Agar plate diffusion method (*A. niger*)—Concentration not cited                 | Inactive [52]   |
|                     |                        | EtOH (95%) ext. of sun dried twig          | Agar plate diffusion method (*A. niger*)—Concentration for drug: 50.0 mg/mL       | Inactive [54]   |
|                     |                        | EtOH (100%) ext. of dried leaf             | Agar plate diffusion method (*A. niger*)—Concentration for drug: 1.0 mg/mL        | Inactive [57]   |
| Biological Activity | Botanical Name                      | Part Tested                          | Bioassay Models                                                                 | Result         |
|---------------------|-------------------------------------|--------------------------------------|----------------------------------------------------------------------------------|----------------|
|                     | *C. microphyllum* Klotzsch           | Acetone, Hexane, MeCl$_2$ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for all drugs: 2.5 mg/mL                | Active [73]    |
|                     |                                     |                                      | Microdilution assay (*C. neoformans*)—MIC for drugs: 0.16, 0.64, 0.08 or 0.16 mg/mL, respectively | Active [73]    |
|                     |                                     |                                      | Microdilution assay (*A. fumigates*)—MIC for all drugs: 2.5 mg/mL                | Active [73]    |
|                     |                                     |                                      | Microdilution assay (*S. schenckii*)—MIC for drugs: 0.64, 0.64, 0.32 or 0.32 mg/mL, respectively | Active [73]    |
|                     | *C. moggi* Exell                     | Acetone, Hexane, MeCl$_2$ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*)—MIC for drugs: 0.64, 1.25, 1.25 or 0.02 mg/mL, respectively | Active [73]    |
|                     |                                     |                                      | Microdilution assay (*C. neoformans*)—MIC for drugs: 0.08, 0.32, 0.32 or 0.04 mg/mL, respectively | Active [73]    |
|                     |                                     |                                      | Microdilution assay (*A. fumigates*)—MIC for all drugs: 2.5 mg/mL                | Active [73]    |
|                     |                                     |                                      | Microdilution assay (*S. schenckii*)—MIC for drugs: 0.02, 0.16, 0.08 or 0.02 mg/mL, respectively | Active [73]    |
|                     | *C. molle* R.Br. ex G. Don.         | MeOH ext. of dried bark              | Microdilution assay (*C. albicans*)—MIC for drug: 5.0 mg/mL                    | Active [129]   |
|                     |                                     | MeOH ext. of dried wood              | Agar plate diffusom method (*C. albicans*)—Concentration for drug: 5.0 mg/disc | Inactive [129] |
|                     |                                     | EtOH/H$_2$O (1:1) ext. of dried leaf | Microdilution assay (*C. albicans, E. floccosum, M. gypseum, T. mentagrophytes or T. rubrum*)—MIC for drug: > 4.0, 0.5, 0.25, 0.25 or 0.5 mg/mL, respectively | Active [72]    |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|----------------|--------|
| MeOH ext. of dried root | Macro-broth tube dilution method (C. albicans)—MIC for drug: 1 mg/mL | Active [136] |
| H₂O ext. of dried root | Macro-broth tube dilution method (C. albicans)—MIC for drug: 6.50 mg/mL | Active [136] |
| Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (C. albicans)—MIC for drugs: 0.04, 1.25, 0.32 or 0.32 mg/mL, respectively | Active [73] |
| | Microdilution assay (C. neoformans)—MIC for drugs: 0.04, 1.25, 0.16 or 0.08 mg/mL, respectively | |
| | Microdilution assay (A. fumigates)—MIC for drugs: 1.25, 2.5, 2.5 or 2.5 mg/mL, respectively | Active [73] |
| | Microdilution assay (S. schenckii)—MIC for drugs: 0.08, 0.32, 0.32 or 0.08 mg/mL, respectively | Active [73] |
| | Microdilution assay (M. canis)—MIC for drugs: 0.02, 0.02, 0.04 or 0.02 mg/mL, respectively | Active [73] |
| C. mossambicense (Klotzsch) Engl. | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (C. albicans)—MIC for drugs: 1.25, 2.5, 2.5 or 1.25 mg/mL, respectively | Active [73] |
| | Microdilution assay (C. neoformans)—MIC for drugs: 1.25, 1.25, 0.64 or 0.64 mg/mL, respectively | Active [73] |
| | Microdilution assay (A. fumigates)—MIC for all drugs: 2.5 mg/mL | |
| | Microdilution assay (S. schenckii)—MIC for drugs: 0.64, 0.16, 0.16 or 0.16 mg/mL, respectively | Active [73] |
| | Microdilution assay (M. canis)—MIC for drugs: 0.08, 0.04, 0.02 or 0.32 mg/mL, respectively | Active [73] |
| C. nelsonii Dümmer | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (C. albicans)—MIC for drugs: 0.04, 0.16, 0.32 or 0.16 mg/mL, respectively | Active [73] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|---------------|-------------|-----------------|--------|
| Microdilution assay (C. neoformans) — MIC for drugs: 0.16, 0.32, 0.32 or 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (A. fumigates) — MIC for drugs: 0.64, 2.5, 0.64 or 0.64 mg/mL, respectively | Active [73] |
| Microdilution assay (S. schenckii) — MIC for drugs: 0.08, 0.32, 0.16 or 0.16 mg/mL, respectively | Active [73] |
| Microdilution assay (M. canis) — MIC for all drugs: 0.02 mg/mL | Active [73] |
| Microdilution assay (C. albicans, E. floccosum, M. gypseum, T. mentagrophytes or T. rubrum) — MIC for drug: >4.0, 1.0, 1.0, 1.0 or 1.0 mg/mL, respectively | Active [72] |
| Microdilution assay (C. albicans, E. floccosum, M. gypseum, T. mentagrophytes or T. rubrum) — MIC for drug: >4.0, 0.25, 0.5, 0.25 or 0.5 mg/mL, respectively | Active [72] |
| Microdilution assay (C. albicans) — MIC for drugs: 0.16, 0.32, 0.32 or >2.5 mg/mL, respectively | Active [73] |
| Microdilution assay (C. neoformans) — MIC for drugs: 0.32, 0.64, 0.32 or 0.32 mg/mL, respectively | Active [73] |
| Microdilution assay (A. fumigates) — MIC for drugs: 0.32, 2.5, 2.5 or 0.32 mg/mL, respectively | Active [73] |
| Microdilution assay (S. schenckii) — MIC for drugs: 0.32, >2.5, >2.5 or 0.64 mg/mL, respectively | Active [73] |
| Microdilution assay (M. canis) — MIC for drugs: 0.08, 0.64, 0.16 or 0.08 mg/mL, respectively | Active [73] |
### Table 1. Cont.

| Biological Activity | Botanical Name          | Part Tested                          | Bioassay Models                                           | Result          |
|---------------------|-------------------------|--------------------------------------|-----------------------------------------------------------|-----------------|
|                     | *C. paniculatum* Vent.  | Acid-EtOH or H₂O ext. of dried leaf | Agar plate diffusion method (*C. albicans*) — Concentration for drug: 0.20 mL/disc (1,000 µg/mL) | Active [132]    |
|                     |                         | MeOH or H₂O ext. of dried root       | Macro-broth tube dilution method (*C. albicans*) — MIC for drugs: 5.55 or 14.44 mg/mL, respectively | Active [136]    |
|                     |                         | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*C. albicans*) — MIC for all drugs: 2.5 mg/mL | Active [73]    |
|                     |                         |                                      | Microdilution assay (*C. neoformans*) — MIC for drugs: 0.32, 1.25, 0.16 or 0.16 mg/mL, respectively | Active [73] |
|                     |                         |                                      | Microdilution assay (*A. fumigates*) — MIC for all drugs: 2.5 mg/mL | Active [73]    |
|                     |                         |                                      | Microdilution assay (*S. schenckii*) — MIC for drugs: 0.32, 0.32, 0.04 or 0.04 mg/mL, respectively | Active [73]    |
|                     | *C. petrophilum* Retief | Acetone, Hexane, MeCl₂ or MeOH ext. of dried leaf | Microdilution assay (*M. canis*) — MIC for drugs: 0.02, 0.02 or 0.08 mg/mL, respectively | Active [73]    |
|                     |                         |                                      | Microdilution assay (*C. albicans*) — MIC for drugs: 0.04, 2.5, 2.5 or 0.04 mg/mL, respectively | Active [73]    |
|                     |                         |                                      | Microdilution assay (*C. neoformans*) — MIC for drugs: 0.02, 0.32, 2.5 or 0.02 mg/mL, respectively | Active [73]    |
|                     |                         |                                      | Microdilution assay (*A. fumigates*) — MIC for all drugs: 2.5 mg/mL | Active [73]    |
|                     |                         |                                      | Microdilution assay (*S. schenckii*) — MIC for drugs: 0.08, 0.32, 0.32 or 0.04 mg/mL, respectively | Active [73]    |
|                     |                         |                                      | Microdilution assay (*M. canis*) — MIC for all drugs: 0.02, 0.04, 0.04 or 0.02 mg/mL, respectively | Active [73]    |
Table 1. Cont.

| Biological Activity | Botanical Name       | Part Tested                              | Bioassay Models (C. albicans)—MIC for drugs: 0.16, 0.08, 0.16 or 0.32 mg/mL, respectively | Bioassay Models (C. neoformans)—MIC for drugs: 0.32, 0.16, 0.16 or 2.5 mg/mL, respectively | Bioassay Models (A. fumigates)—MIC for drugs: 1.25, 2.5, 1.25 or 2.5 mg/mL, respectively | Bioassay Models (S. schenckii)—MIC for drugs: 0.32, 0.32, 0.32 or 1.25 mg/mL, respectively | Bioassay Models (M. canis)—MIC for all drugs: 0.32 mg/mL | Result          |
|---------------------|----------------------|------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------|
| C. woodii Dümmer    | Acetone, Hexane, MeCl2 or MeOH ext. of dried leaf | Microdilution assay                        | Active [73]                                                                                       |                                                                                              |                                                                                             |                                                                                             |                                                                                      |                |
| C. zeyheri Sond.    | MeOH ext. of dried entire plant                    | Agar plate diffusion method (C. albicans or T. mentagrophytes)—Concentration for drug: 0.03 mg/mL | Active [137]                                                                                      |                                                                                              |                                                                                             |                                                                                             |                                                                                      |                |
| C. micranthum G. Don| H2O ext. of leaves                                   | Streptozotocin-induced diabetic in rat—Dose for drug: 0.75 g/kg (p.o.)                          | Active [63]                                                                                       |                                                                                              |                                                                                             |                                                                                             |                                                                                      |                |

Hypoglycemic activity

- **C. decandrum** Roxb. (DC) EtOH (70%) ext. of dried leaf
  - Streptozotocin-induced diabetic in rat—Dose for drug: 0.75 g/kg (p.o.)
  - Active [138]
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|---------------|-------------|----------------|--------|
| Antiinflammatory activity | *C. collinum* Fresen. | H₂O ext. of dried stem bark | 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced ear inflammation in mice—Dose for drug: 0.5 mg/ear Carrageenan-induced pedal edema in mice—Dose for drug: 100.0 mg/kg (p.o.) | Active [139] |
| | *C. dolichopetalum* Gils ex Engl. | MeOH ext. of dried root | Carrageenan-induced paw edema in mice—Doses for drug: 200, 400 or 600.0 mg/kg (p.o.) | Active [96] |
| | | CHCl₃ ext. of dried root | Croton oil-induced ear edema in mice—Doses for drug: 0.25, 0.5 or 1.0 mg/ear | Active [96] |
| | *C. apiculatum* Sond. subsp. *apiculatum* Brandis ex Engl. | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| | *C. bracteosum* (Hochst.) Brandis ex Engl. | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| | *C. celastroides* Welw ex Laws subsp. *celastroides* | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| | *C. collinum* Fresen. subsp. *suluense* (Engl. & Diels) Okafor | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| | *C. duarteanum* Cambess. | EtOH ext. of dried leaf | Carrageenan or arachidonic acid-induced hind paw edema in mice—Doses for drug: 200 or 400 mg/kg (i.p.) | Active [140] |
| | *C. edwardsii* Exell | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| | *C. erythrophyllum* (Burch.) Sond. | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| *C. hartmannianum*  | MeCl₂ or EtOH ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration for all drugs: 250 µg/mL | Active [126] |
| Schweinf.           | AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration for drug: 250 µg/mL | Inactive [126] |
|                     | MeCl₂ or AcOEt ext. of dried bark | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration for all drugs: 250 µg/mL | Inactive [126] |
|                     | EtOH ext. of dried bark | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration for drug: 250 µg/mL | Active [126] |
|                     | MeCl₂, AcOEt or EtOH ext. of dried root | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration for all drugs: 250 µg/mL | Inactive [126] |
| *C. hereroense*     | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| Schinz              | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| *C. imberbe*       | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| Wawra              | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| *C. kraussii*      | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| Hochst.            | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| *C. microphyllum*  | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| Klotzsch           | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| *C. mkuzense*      | H₂O, Acetone or AcOEt ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| Carr & Retief       | H₂O ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Active [112] |
| *C. moggii*        | H₂O ext. of dried leaf | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited | Inactive [112] |
| Biological Activity | Botanical Name                      | Part Tested                     | Bioassay Models                                                                 | Result       |
|---------------------|------------------------------------|---------------------------------|--------------------------------------------------------------------------------|--------------|
|                     |                                    |                                 | *In vitro*-Cyclooxygenase-1 (COX-1) inhibition by radioactivity bioassay—Concentration not cited |              |
|                     | *C. molle* R. Br. Ex G. Don        | Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     |                                    | H₂O, Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     | *C. massambicense* (Klotzsch) Engl. | H₂O, Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     | *C. nelsonii* Dümmer               | H₂O, Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     | *C. padoides* Engl. & Diels        | H₂O, Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     | *C. paniculatum* Vent.             | H₂O, Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     | *C. petrophilum* Retief            | H₂O, Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     | *C. woodii* Dümmer                 | H₂O ext. of dried leaf          | Inactive [112]                                                                |              |
|                     | *C. hartmannianum* Schweinf.       | Acetone or AcOEt ext. of dried leaf | Active [112]                                                                   |              |
|                     |                                    | MeCl₂, EtOAc or EtOH ext. of dried leaf | Active [126]                                                                   |              |
|                     | *C. micranthum* G. Don.            | Hot H₂O of dried aerial parts  | Radioactivity assays of PGs isolated of stomach in rat—Concentration for drug: 100.0 µL/mL | Inactive [141] |
### Table 1. Cont.

| Biological Activity       | Botanical Name        | Part Tested                  | Bioassay Models                                                                 | Result       |
|---------------------------|-----------------------|------------------------------|---------------------------------------------------------------------------------|--------------|
|                            |                       | H₂O ext. of dried leaf       | Carrageenan-induced paw oedema or Cotton pellet granuloma formation in rats—Doses for drug: 50 or 100 mg/kg (*p.o.*) | Active [142] |
|                            |                       |                              | Acetic acid-induced vascular permeability in mice—Doses for drug: 50 or 100 mg/kg (*p.o.*) | Active [142] |
| **Antinociceptive activity** |                       |                              |                                                                                  |              |
|                           | *C. duarteanum* Cambess. | EtOH ext. of dried leaf      | Acid-induced writhing, formalin, and hot-plate nociception tests in mice—Doses for drug: 100, 200, or 400 mg/kg (*i.p.*) | Active [140] |
|                           | *C. leprosum* Mart.    | EtOH ext. of dried flowers   | Formalin induced nociception in mice—Doses for drug: 100 and 300 mg/kg (*p.o.*) | Active [7]    |
|                            |                       |                              | Abdominal contortion by acetic acid in mice—Doses for drug: 30, 100, 300, 1,000 mg/kg (*p.o.*) | Active [7]    |
|                            |                       |                              | Capsaicin-induced nociception in mice—Doses for drug: 30, 100, 300, 1,000 mg/kg (*p.o.*) | Active [7]    |
|                            |                       |                              | Glutamate induced nociception in mice—Doses for drug: 10, 30, 100, 300 mg/kg (*p.o.*) | Active [7]    |
|                            |                       |                              | Hot plate test in mice—Doses for drug: 10, 30, 100, 300 mg/kg (*p.o.*) | Active [7]    |
|                            |                       | EtOH (70%) ext. of dried stem bark | Tail immersion test and Formalin-induced pain in mice—Doses for drug: 25.0 mg/kg (*i.p.*) or 500.0 mg/kg (*p.o.*) | Active [143] |
| **Antioxidant activity**   |                       |                              |                                                                                  |              |
|                           | *C. decandrum* Roxb. (DC) | EtOH (70%) ext. of dried leaf | Thiobarbituric acid-reactive substance or ferrous ion oxidation xyleneol orange in rats—Dose for drug: 0.75 g/kg (*p.o.*) | Active [138] |
| Biological Activity                  | Botanical Name          | Part Tested                     | Bioassay Models                                                                 | Result  |
|------------------------------------|-------------------------|---------------------------------|---------------------------------------------------------------------------------|---------|
| **Anti-tumour activity**           | **C. duarteanum** Cambess. | EtOH ext. of dried leaf         | Thiobarbituric acid-reactive substance, hydroxyl radical-scavenging, or scavenging activity of nitric oxide assays. | Active [140] |
| **C. caffrum** (Eckl. and Zeyh.) Kuntze | CHCl₃, CCl₄ or CH₂Cl₂ fractions of dried fruit, leaf, stem or twig | *In vitro*-Cell culture (immature astrocytoma 224c glioma cell)—Concentration for drugs: 1.0–100 μg/mL | Active [144] |
|                                    | CCl₄ or CH₂Cl₂ fraction of dried fruit, leaf, stem or twig | *In vitro*-P388 lymphocytic leukemia cell growth inhibition (ED₅₀ for drugs: 1.5 or 0.23 μg/mL, respectively) | Active [144] |
|                                    | MeCl₂ ext. of dried root bark | Murine P-388 lymphocytic leukemia cell growth inhibition—Doses for drugs (i.p.): 100 or 50 mg/kg, respectively | Active [144] |
| **C. collinum** Fresen.            | MeOH, EtOH or MeOH-H₂O ext. of dried air parts | *In vitro*-Cell culture (Squamous carcinoma KB, Melanoma SK—MEL28, lung carcinoma A549, or mamma carcinoma MDA—MB231)-IC₅₀ for all drugs: 20.0 μg/mL | Active [57] |
| **Antitussive activity**           | **C. glutinosum** Perrot. ex DC | H₂O ext. of dried leaf           | Guinea pig—Dose for drug: 1.0 mg/kg (p.o.) | Active [146] |
| **Antiviral activity**             | **C. glutinosum** Perrot. ex DC | Decoction of leaf                | *In vitro*-Cell culture (hepatitis B virus antigen HBsAg)-IC₅₀ for drug: 100.0–500 ng/mL | Active [147] |
Table 1. Cont.

| Biological Activity | Botanical Name        | Part Tested          | Bioassay Models                                                                 | Result      |
|---------------------|-----------------------|----------------------|--------------------------------------------------------------------------------|-------------|
|                     | *C. grandiflorum* G. Don | EtOH (80%) ext       | *In vitro*-Cell culture (plaque-inhibition in cells infected with virus *Adenovirus*)—Concentration not cited | Inactive [148] |
|                     |                       | EtOH (80%) ext       | *In vitro*-Cell culture (plaque-inhibition in cells infected with virus *Herpes* type 1)—Concentration for drug: | Inactive [148] |
|                     |                       |                      | In vitro-Cell culture (plaque-inhibition in cells infected with virus *measles*)—Concentration not cited | Inactive [148] |
|                     | *C. micranthum* G. Don. | MeOH ext. of dried leaf | *In vitro*-Cell culture: African green monkey cells infected with virus *Herpes simplex* 1 or *H. simplex* 2—Concentration for drug: 7.5 μg/mL | Active [58] |
| *C. paniculatum* Vent. | MeOH ext. of dried leaf |                      | *In vitro*-Cell culture: MT-4 cells infected with virus human immunodeficiency type 1 (HIV 1)—IC₅₀ for drug: 5.2 μg/mL | Active [149] |
|                     |                       |                      | *In vitro*-Cell culture: MT-4 cells infected with virus HIV 2 (rod)—Concentration for drug: >24.6 μg/mL | Inactive [149] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|----------------|--------|
|                     |                | EtOH (80%) ext. of dried leaf | *In vitro*-Cell culture: MT-4 cells infected with virus HIV 1 or HIV 2 (ROD)—Concentration for drug: >23.5 µg/mL | Inactive [149] |
|                     |                | Pet ether ext. of dried leaf | *In vitro*-Cell culture: MT-4 cells infected with virus HIV 1 or HIV 2 (ROD)—Concentration for drug: >118 µg/mL | Inactive [149] |
|                     |                | MeCl₂ ext. of dried leaf | *In vitro*-Cell culture: MT-4 cells infected with virus HIV 1 or HIV 2 (ROD)—Concentration for drug: >44.7 µg/mL | Inactive [149] |
|                     |                | Acetone ext. of dried leaf | *In vitro*-Cell culture: MT-4 cells infected with virus HIV 1 or HIV 2 (ROD)-IC₅₀ for drug: 15.0 or 3.0 µg/mL, respectively | Active [149] |
|                     | *C. quadrangulare* Kurz. | EtOH (95%) or H₂O ext. of dried leaf | *In vitro*-HIV 1 integrase inhibition by cell culture with virus HIV 1)-IC₅₀ for drugs: 2.5 or 2.9 µg/mL, respectively | Active [103] |
|                     | *C. molle* R. Br. Ex G. Don | H₂O or MeOH ext. of roots | *In vitro*-RNA-dependent-DNA polymerase (RDDP) activity of HIV1 reverse transcriptase-IC₅₀ for drugs: 37 or 9.7 µg/mL, respectively | Active [80] |
| **Immunostimulant activity** | | | | |
|                     | *C. micranthum* G. Don | Suspension of powder leaf | Rate of clearance of colloidal carbon by mice—Dose for drug: 100.0 mg/kg (i.v.) | Active [62] |
| **Cardiovascular activity** | | | | |
|                     | *C. hypopilinum* Diels | MeOH ext. of seed | Depressant cardiac in rabbit - Dose not cited | Active [150] |
|                     | *C. nigricans* Lepr. | MeOH ext. of seed | Rabbit-heart- Dose not cited | Active [150] |
|                     | *C. yokodense* Engl. | MeOH ext. of seed | Rabbit-heart- Dose not cited | Active [150] |
|                     | *C. verticillatum* Engl. & Diels | MeOH ext. of seed | Rabbit-heart- Dose not cited | Active [150] |
| Biological Activity | Botanical Name       | Part Tested                        | Bioassay Models                                                                 | Result          |
|---------------------|----------------------|------------------------------------|---------------------------------------------------------------------------------|-----------------|
|                      | *C. racemosum* P. Beauv | Hot H₂O ext. of dried leaf         | Blood pressure blocked by DHE in cat—Dose for drug: 0.5 mL/kg (*i.v.*)          | Inactive [151]  |
|                      | *C. hypopilium* Diels | MeOH ext                          | Hypotensive in cat—Dose for drug: 250.0 mg/kg (*i.v.*)                           | Active [150]    |
|                      | *C. nigricans* Lepr.  | MeOH ext. of seed                  | Hypotensive in cat—Dose for drug: 250.0 mg/kg (*i.v.*)                           | Active [150]    |
|                      | *C. ovalifolium var. cooperi* | EtOH/H₂O (1:1) ext. of aerial parts | Cat—Dose for drug: 50.0 mg/kg (*i.v.*)                                           | Active [152]    |
|                      | *C. sokodense* Engl.  | MeOH ext. of seed                  | Hypotensive in cat—Dose for drug: 250.0 mg/kg (*i.v.*)                           | Active [150]    |
|                      | *C. verticillatum* Engl. & Diels | MeOH ext. of seed                  | Hypotensive in cat—Dose for drug: 250.0 mg/kg (*i.v.*)                           | Active [150]    |
| CNS activity         |                      |                                    |                                                                                  |                 |
|                      | *C. hypopilium* Diels | MeOH ext. of seed                  | Depressant CSN im mice—Dose for drug: 0.5 mg/kg (*i.p.*)                          | Active [150]    |
|                      | *C. nigricans* Lepr.  | MeOH ext. of seed                  | Depressant CSN im mice—Dose for drug: 0.5 mg/kg (*i.p.*)                          | Active [150]    |
|                      | *C. paniculatum* Vent. | MeOH ext. of seed                  | Stimulate CSN im mice—Dose for drug: 0.5 mg/kg (*i.p.*)                           | Active [150]    |
|                      | *C. sokodense* Engl.  | MeOH ext. of seed                  | Depressant CSN im mice—Dose for drug: 0.5 mg/kg (*i.p.*)                          | Active [150]    |
|                      | *C. verticillatum* Engl. & Diels | MeOH ext. of seed                  | Depressant CSN im mice—Dose for drug: 0.5 mg/kg (*i.p.*)                          | Active [150]    |
| Toxicity studies     |                      |                                    |                                                                                  |                 |
| Mutagenicity         | *C. erythrophyllum* (Burch.) Sond. | H₂O ext. of dried root             | *In vitro*-Agar plate with *S. typhimurium* TA97a and TA98—Concent. for drug: 100.0–20.0 μg/disc | Inactive [90]   |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
|                     |                |             | *In vitro*-Agar plate with *S. typhimurium* TA100 and TA102—Concentration for drug: 40.0, 70.0, 80.0, 90.0, 100.0 µg/disc | Active [90] |
|                     |                |             | *In vitro*-Spermatocytes drosophila sex-linked recessive lethal concentration 50% (LD$_{50}$)—Dose for drug: 1.0 mg/mL | Active [86] |
| Cytotoxicity        | *C. apiculatum* Sond. subsp *apiculatum* | MeOH ext. of dried leaf | *In vitro*-Cell culture (T24 bladder or MCF7 breast cancer)—Concentration of drug: 25 µg/mL | Active [15] |
|                     |                | MeOH ext. of dried root | *In vitro*-Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration of drug: 25 µg/mL | Active [15] |
|                     | *C. aculeatum* Vent. | MeCl$_2$, MeOH, H$_2$O ext. of dried leaf | *In vitro*-Cell culture Concentration for drugs: 500.0 µg/mL or 500.0 ppm | Inactive [122] |
|                     |                | H$_2$O ext. of dried root | *In vitro*-Cell culture (SW480 colon cancer cells)—Concentration for drug: 500.0 ppm | Inactive [122] |
|                     |                | MeCl$_2$ ext. of dried root | *In vitro*-Cell culture (CO115 colon cancer cells)—Concentration for drug: 500.0 µg/mL | Inactive [122] |
|                     |                | MeOH or H$_2$O ext. of dried root | *In vitro*-Cell culture (CO115 colon cancer cells)—Concentration for drugs: 500.0 ppm | Inactive [122] |
|                     |                | MeCl$_2$ ext. of dried stem | *In vitro*-Cell culture (SW480 colon cancer cells or CO115 colon cancer cells)—Concentration for drug: 500.0 µg/mL | Inactive [122] |
|                     |                | MeOH or H$_2$O ext. of dried stem | *In vitro*-Cell culture (SW480 colon cancer cells or CO115 colon cancer cells)—Concentration for drugs: 500.0 ppm | Inactive [122] |
Table 1. Cont.

| Biological Activity | Botanical Name                  | Part Tested            | Bioassay Models                                                                 | Result     |
|---------------------|---------------------------------|------------------------|----------------------------------------------------------------------------------|------------|
| C. collinum Fresen. | MeOH ext. of dried leaf         | Cell culture (T24 bladder or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
|                     | MeOH ext. of dried root         | Cell culture (T24 bladder, HELA cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
| C. comosum G. Don.  | MeOH, MeOH/H₂O (50:50) or       | In vitro-Cell culture (THP1 human monocytes)-IC₅₀ for drugs: 63.1, >100 or 98.3 µg/mL, respectively | Active [116] |
|                     | MeCl₂ ext. of dried leaves       |                        |                                                                                  |            |
| C. cuspidatum Planch. ex Benth. | MeOH, MeOH/H₂O (50:50) or       | In vitro-Cell culture (THP1 human monocytes)-IC₅₀ for drugs: >100, >100 or 25.3 µg/mL, respectively | Active [116] |
|                     | MeCl₂ ext. of stem barks         |                        |                                                                                  |            |
| C. duarteanum Cambess. | EtOH (95%) ext. of dried leaf    | In vitro-Cell culture (KB cells)—Concentration not cited | Active [153] |
|                     | EtOH (95%) ext. of dried root    | In vitro-Cell culture (KB cells)—Concentration not cited | Active [153] |
|                     | EtOH (95%) ext. of dried stem    | In vitro-Cell culture (KB cells)—Concentration not cited | Active [153] |
| C. fragrans F. Hoffm. | MeOH ext. of dried leaf or       | Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drugs: 25 µg/mL | Active [15] |
|                     | dried root                      |                        |                                                                                  |            |
| C. fruticosum (Loefl.) Stuntz | EtOAc ext                      | In vitro-Cell culture (CA-9KB)—ED₅₀ for drug: 6.5 µg/mL | Active [154] |
|                     | H₂O ext                         | In vitro-Cell culture (CA-9KB)—ED₅₀ for drug: 10.0 µg/mL | Active [154] |
|                     | Type ext. not stated             | In vitro-Cell culture (CA-9KB)—Dose for drug: >100 µg/mL | Inactive [154] |
|                     | Hexane ext.                     | In vitro-Cell culture (CA-9KB)—ED₅₀ for drug: 11.0 µg/mL | Active [154] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|----------------|--------|
|                     | *C. hereroense* Schinz | MeOH ext. of dried stem bark | Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
|                     | *C. micranthum* G. Don | MeOH ext. of dried leaf | *In vitro*-Cell culture (human monocytes-THP1 cells)—Concentration for drug: >25.0 µg/mL | Inactive [61] |
|                     | | MeOH ext. of dried leaf or dried root | *In vitro*-Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drugs: 25 µg/mL | Active [15] |
|                     | *C. nigricans* Lepr. | MeOH ext. of fresh leaf | *In vitro*-Cell culture (U-373 MG human astrocytoma cells)—IC<sub>50</sub> for drug: 41.0 µg/mL | Active [155] |
|                     | | | *In vitro*-Cell culture (HCT-15 colon human cells)—IC<sub>50</sub> for drug: 41.0 µg/mL | Active [155] |
|                     | | | *In vitro*-Cell culture (A549 cancer cells)—IC<sub>50</sub> for drug: 41.0 µg/mL | Active [155] |
|                     | *C. ovalifolium* Roxb. var. cooperi | EtOH-H<sub>2</sub>O (1:1) ext. of aerial parts | *In vitro*-Cell culture (CA-9KB cells)—Dose for drug: >20.0 µg/mL | Inactive [152] |
|                     | *C. padoides* Engl. & Diels | MeOH ext. of dried stem bark | *In vitro*-Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
|                     | | MeOH ext. of dried root | *In vitro*-Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
|                     | *C. psidioides* Welw. | MeOH ext. of dried stem bark | *In vitro*-Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|---------------|-------------|----------------|--------|
| C. zeyheri Sond.    | MeOH ext. of dried fruit | *In vitro*—Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
|                     | MeOH ext. of dried root | *In vitro*—Cell culture (T24 bladder, HeLa cervical or MCF7 breast cancer)—Concentration for drug: 25 µg/mL | Active [15] |
|                     | MeCl₂ ext. of dried leaf | *In vitro*—Cell culture (Renal TK10, Breast MCF7 or Melanoma UACC62 cancer)—IC₅₀ for drug: 15.00, 28.21 or 10.33 mg/mL, respectively | Active [156] |
| C. erythrophyllum (Burch) Sond | MeOH ext. of dried wood | *In vitro*-DNA damage assay—Cell culture Ycp (gal) or pRAD52 (glu)—IC₅₀ for drug: 4.0 or 15 µg/mL, respectively | Active [91] |
|                     | MeCl₂ ext. of dried wood | *In vitro*-DNA damage assay—Cell culture Ycp (gal), pRAD52 (gal), pRAD52 (glu), phTOP1 (gal) or phTOP1 (glu)—IC₅₀ for drug: 2.0, 34.0, 31.0, 3.3 or 4.3 µg/mL, respectively | Active [91] |
|                     | EtOAc soluble fraction of dried wood | *In vitro*-DNA damage by agar diffusion assay (RS188-WT erg6 or RS321-Rad52.erg6.top1)—IC₅₀ for drug: 73.7 or 5.9 µg/mL, respectively | Active [91] |
|                     | EtOAc soluble fraction of dried wood | *In vitro*-DNA damage assay—Cell culture Ycp (gal) or pRAD52 (glu)—IC₅₀ for drug: 4.0 or 12 µg/mL, respectively | Inactive [91] |
Table 1. Cont.

| Biological Activity | Botanical Name         | Part Tested                                      | Bioassay Models                                                                 | Result  |
|---------------------|------------------------|--------------------------------------------------|---------------------------------------------------------------------------------|---------|
| Brine shrimp lethality | **C. aculeatum** Vent. | MeCl₂, MeOH and H₂O ext. of dried leaf, dried root bark or dried stem | *In vitro*-Toxicity bioassay with *Artemia salina* L.—Concentration for all drugs: 500.0 μg/mL | Inactive [122] |
|                     | **C. micranthum** G. Don | EtOH (100%) ext. of dried leaf                    | *In vitro*-Toxicity bioassay with *A. salina* L.—LC₅₀ for drug: 112.0 μg/mL    | Active [56] |
|                     |                        | CHCl₃ or H₂O ext. of dried leaf                   | *In vitro*-Toxicity bioassay with *A. salina* L.—LC₅₀ for drugs: 492.0 or 634.0 μg/mL, respectively | Inactive [56] |
|                     |                        | EtOH (100%) ext. of dried bark                    | *In vitro*-Toxicity bioassay with *A. salina* L.—LC₅₀ for drug: 432.0 μg/mL    | Inactive [56] |
|                     | **C. zeyheri** Sond    | MeOH ext. of dried root                           | *In vitro*-Toxicity bioassay with *A. salina* L.—Concentration for all drugs: >0.1 mg/mL | Inactive [157] |
| Molluscicidal       | **C. aculeatum** Vent. | MeCl₂, MeOH or H₂O ext. of dried leaf, dried root or dried stem | *In vitro*-Toxicity bioassay with *Biomphalaria glabrata*—Concentration for all drugs: 400.0 ppm | Inactive [122] |
|                     | **C. dolichopetalum** Gils ex Engl. | MeOH ext. of dried leaf                           | *In vitro*-Toxicity bioassay with *B. globosus* snail—Concentration for drug: 100.0 ppm | Inactive [158] |
|                     | **C. ghasalense** Engl. & Diels | MeOH ext. of dried fruit or dried leaf            | *In vitro*-Toxicity bioassay with *B. globosus* snail—Concentration for all drugs: 100.0 ppm | Inactive [158] |
|                     |                        | MeOH ext. of dried root or dried stem             | *In vitro*-Toxicity bioassay with *B. globosus* snail—Concentration for all drugs: 100.0 ppm | Active [158] |
|                     |                        | MeOH ext. of dried stem                           | *In vitro*-Toxicity bioassay with *B. globosus* snail—Concentration for drug: 100.0 ppm | Active [159] |
|                     | **C. glutinosum** Perrot. ex DC | MeOH ext. of dried fruit, dried root or dried stem | *In vitro*-Toxicity bioassay with *B. globosus* snail—Concentration for all drugs: 100.0 ppm | Inactive [158] |
|                     | **C. leprosum** Mart.  | EtOH (95%) or H₂O ext. of dried stem bark         | *In vitro*-Toxicity bioassay with *B. glabrata* or *B. straminea*—Concentration for all drugs: 1,000 ppm | Active [160] |
| Biological Activity          | Botanical Name                  | Part Tested                  | Bioassay Models                                                                 | Result          |
|------------------------------|--------------------------------|------------------------------|---------------------------------------------------------------------------------|-----------------|
|                              | **C. micranthum** G. Don        | MeOH ext. of dried leaf      | *In vitro*-Toxicity bioassay with *B. globosus* snail—Concentration for drug: 100.0 ppm | Inactive [158]  |
|                              | **C. molle** R. Br. ex G. Don   | H₂O ext. of dried leaf       | *In vitro*-Toxicity bioassay with *Biomphalaria pfeifferi*—Concentration for drug: 1:1,000 (v:v) | Active [75]     |
| Toxicity on mammals          | **C. decandrum** Roxb. (DC)     | EtOH 50% ext. of entire plant| Lethal dose 50% (LD₅₀) in mice—LD₅₀ for drug: 1.0 mg/kg (i.p.)                  | Active [161]    |
|                              | **C. dolichopetalum** Gils ex   | EtOH (70%) ext. of dried root| LD₅₀ in rats—LD₅₀ for drug: 246.0 mg/kg (i.p.)                               | Active [97]     |
|                              | Engl.                          | bark                         |                                                                                  |                 |
|                              | **C. hypopilium**               | MeOH ext.                    | LD₅₀ in mice—LD₅₀ for drug: 2.3 mg/kg (i.v.)                                   | Active [150]    |
|                              | **C. leprosum** Mart.           | EtOH (70%) ext. of dried stem| LD₅₀ in mice—LD₅₀ for drug: 4,722 mg/kg (p.o.)                                | Active [143]    |
|                              |                                | bark                         |                                                                                  |                 |
|                              | **C. nanum** Ham. ex D. Don.    | EtOH-H₂O (1:1) ext. of dried | LD₅₀ in mice—LD₅₀ for drug: 500.0 mg/kg (i.p.)                               | Active [162]    |
|                              | Engl.                          | entire plant                 |                                                                                  |                 |
|                              | **C. nigricans** Lepr.          | MeOH ext. of seed            | Lethal dose 50% (LD₅₀) in mice—LD₅₀ for drug: 580.0 mg/kg (i.v.)               | Active [150]    |
|                              |                                |                              |                                                                                  |                 |
|                              | **C. ovalifolium** Roxb. var.   | EtOH-H₂O (1:1) ext. of aerial | Lethal dose 50% (LD₅₀) in mice—LD₅₀ for drug: 500.0 mg/kg (i.p)               | Active [152]    |
|                              | cooperi                        | parts                        |                                                                                  |                 |
|                              | **C. racemosum** P. Beauv       | Hot H₂O or EtOH (95%) ext. of| Lethal dose 50% (LD₅₀) in mice—LD₅₀ for drug: 17.78 mL/kg (i.p)               | Active [151]    |
|                              |                                | dried leaf                   |                                                                                  |                 |
|                              | **C. sokodense** Engl.          | MeOH ext. of seed            | Lethal dose 50% (LD₅₀) in mice—LD₅₀ for drug: 700.0 mg/kg (i.v.)               | Active [150]    |
|                              |                                |                              |                                                                                  |                 |
|                              | **C. verticillatum** Engl. &    | MeOH ext. of seed            | Lethal dose 50% (LD₅₀) in mice—LD₅₀ for drug: 800.0 mg/kg (i.v.)               | Active [150]    |
|                              | Diels                         |                              |                                                                                  |                 |
| Antihepatotoxicity           | **C. dolichopetalum** Gils ex   | EtOH (95%) ext. of fresh root| Paracetamol-induced hepatotoxicity in rat—Dose for drug: 100.0 mg/kg (p.o.)   | Active [95]     |
|                              | Engl.                          | bark                         |                                                                                  |                 |
| Biological Activity       | Botanical Name          | Part Tested                     | Bioassay Models                                                                 | Result            |
|--------------------------|-------------------------|---------------------------------|---------------------------------------------------------------------------------|-------------------|
| **Abortifacient**        |                         |                                 |                                                                                 |                   |
| *C. glutinosum* Perrot. ex DC | Decoction of leaf       | *In vitro*-Inhibit hepatitis B virus antigen (HBsAg)—Concentration for drug: 100–500 ng/mL | Active [147]           |                   |
| **Embryotoxic**          |                         |                                 |                                                                                 |                   |
| *C. racemosum* P. Beauv  | Hot H₂O ext. of dried leaf | Abortion in 7 days after oral administration of 10 g/mL in pregnant guinea pig | Active [151]           |                   |
| **Gastrintestinal activity** |                         |                                 |                                                                                 |                   |
| **Gastric antiulcer**    |                         |                                 |                                                                                 |                   |
| *C. dolichopetalum*      | EtOH (70%) ext. of dried root | Pyloric ligation together with histamine-induced ulcers and gastric secretions in rats—Dose for drug: 400.0 mg/kg (p.o.) | Active [93]         |                   |
|                          | EtOH (16%) ext. of dried root | Indomethacin and cold stress-induced ulcers in guinea pig—Dose for drug: 100.0 mg/kg (p.o.) | Active [94]           |                   |
| Biological Activity | Botanical Name | Part Tested | Bioassay Models | Result |
|---------------------|----------------|-------------|-----------------|--------|
| C. duarteanum Cambess | EtOH or Hexane ext. of dried leaf | HCl/Ethanol, piroxican or immobilization-cold stress-induced ulcers in mice—Dose for drug: 62.5, 125, 250 and 500 mg/kg (p.o.) | Active [163] |
| C. leprosum Mart. & Eiche | EtOH ext. of dried stem bark | Ethanol or Indomethacin induced gastric ulcer in rats—Doses for drug: 60, 125 and 250 mg/kg (p.o.) | Active [164] |
| C. dolichopetalum Gils ex Engl. | EtOH (70%) ext. of dried root | Delayed gastric emptying in rat—Dose for drug: 400.0 mg/kg (p.o.) | Active [93] |
| C. ovalifolium var. cooperi | EtOH-H2O (1:1) ext. of aerial parts | Ach and histamine-induced contractions in guinea pig ileum—Concentration not cited | Active [152] |
| C. racemosum P. Beauv | Hot H2O ext. of dried leaf | Ach, nicotine or histamine-induced contractions in guinea pig ileum—Concentration for drug: 1.0g/mL Spontaneous contractions in rabbit jejunum blocked by DHE and propranolol—Concentration for drug: 0.2–1 g/mL | Inactive [151] |
| C. dolichopetalum Gils ex Engl. | EtOH (70%) ext. of dried root | Ach or histamine-induced contractions in guinea pig ileum—Concentration for drug: 0.24 μg/mL Ach or histamine-induced contractions in guinea pig ileum—Concentration for drug: 10 μg/mL Relaxation effect in guinea pig ileum—EC50 for drug: 2.65 mg/mL | Active [93] |
| Genitourinary activity | C. erythrophyllum (Burch.) Sond. | H2O or EtOH (95%) ext. of dried leaf | In vitro-Radioactivity of cyclooxygenase (prepared from sheep seminal vesicle microsomal fractions)—Concentration for drugs: 20.0 mg/mL or 2.5 mg/mL, respectively | Active [92] |
Table 1. Cont.

| Biological Activity | Botanical Name                  | Part Tested                          | Bioassay Models                                                                 | Result |
|---------------------|--------------------------------|--------------------------------------|---------------------------------------------------------------------------------|--------|
|                     |                                | H₂O or EtOH (95%) ext. of dried leaf | Ach-induced contractility uterine in guinea pig—Dose for drugs: 10 mg/mL         | Active [92]  |
|                     |                                | Hot H₂O ext. of dried branch and leaf| In vitro—Contractions of uterus isolated from rat—Concentration not cited        | Active [165]  |
|                     | C. kraussii Hochst.            | Hot H₂O ext. of dried root           | In vitro—Contractions of uterus isolated from rat—Concentration not cited        | Active [165]  |
|                     | C. nanum Ham. ex. D. Don.      | EtOH/H₂O (1:1) ext. of dried entire plant | Spermicidal effect in rat—Concentration not cited                              | Inactive [162]  |
|                     | C. platypetalum Sond.          | H₂O or EtOH (95%) ext. of dried leaf | In vitro—Radioactivity of cyclooxygenase (prepared from sheep seminal vesicle microsomal fractions)—Concentration for drugs: 20.0 mg/mL or 2.5 mg/mL, respectively Ach or oxytocin-induced contractility uterine in guinea pig—Dose for drugs: 10 mg/mL. | Active [92]  |
|                     | C. racemosum P. Beauv          | Hot H₂O ext. of dried leaf           | In vitro—Contractions in guinea pig gravid and non-gravid uterus blocked by hydergine—Concentration for drug: 1–2 g/mL Ext. induced spontaneous contractions in guinea pig vas deferens—Concentration for drug: 0.5 g/mL | Inactive [151]  |
|                     | C. zeyheri Sond.               | H₂O or EtOH (95%) ext. of dried bark | Radioactivity of cyclooxygenase (prepared from sheep seminal vesicle microsomal fractions)—Concentration for drugs: 20.0 mg/mL or 2.5 mg/mL, respectively Ach or oxytocin-induced contractility uterine in guinea pig—Dose for drugs: 10 mg/mL. | Inactive [92]  |

i.p. = intraperitoneal; p.o. = oral; i.v. = intravenous; EtOH ext. = ethanolic extract; H₂O ext. = aqueous extract; MeOH ext. = methanolic extract; EtOAc ext. = ethyl acetate extract; CHCl₃ ext. = chloroformic extract; CCl₄ ext. = carbon tetrachloride extract; MeCl₂ ext. = dichlormethane extract; EtOH/H₂O ext. = crude aqueous/alcoholic extract; MeOH/H₂O ext. = aqueous/methanolic extract; CHCl₃/MeOH ext. = chloroformic and methanolic extract; MeOH/MeCl₂ ext. = methanolic/dichloromethane extract; Pet ether ext. = Petroleum ether extract. Ach = Acetylcholine; DHE = Dihydroergotamine; ACE = Angiotensin converting enzyme.
4. Conclusions

The research papers cited in this review contribute to justifying the traditional use of the genus *Combretum* for the treatment of various health problems. This genus presents itself as a promising new scientific research topic to investigate the pharmacological potential of the extracts, fractions and compounds isolated from plant species of this genus.

We see that there is a need for further studies on the standardization or chemical characterization of the extracts used and for other more detailed phytochemical studies. With respect to pharmacological studies, there is an increasing need for further *in vivo* investigations of toxicity and biological activities, as well as for insights into the possible mechanisms involved. Therefore, new research findings could lead to greater safety and benefits to people who use these species to treat diseases, contributing to a better access to health care and thereby a better quality of life.

Acknowledgements

The authors thank the University of Illinois at Chicago, USA for the use of the NAPRALERT database for this study and A. Leyva for the English revision of the manuscript. Thanks are in order also for the financial support provided by CAPES/CNPq/PRONEX-FAPESQ.

References

1. Hoareau, L.; Da Silva, E.J. Medicinal plants: A re-emerging health aid. *Eletron. J. Biotechnol.* 1999, 2, 56–70.
2. Edeoga, H.O.; Okwu, D.E.; Mbaebie, B.O. Phytochemical constituents of some Nigerian medicinal plants. *Afr. J. Biotechnol.* 2005, 4, 685–688.
3. Agra, M.F.; Freitas, P.F.; Barbosa-Filho, J.M. Synopsis of the plants known as medicinal and poisonous in Northeast of Brazil. *Rev. Bras. Farmacogn.* 2007, 17, 114–140.
4. Atindehou, K.K.; Schmid, C.; Brun, R.; Koné, M.W.; Traore, D. Antitrypanosomal and antiplasmodial activity of medicinal plants from Côte d’Ivoire. *J. Ethnopharmacol.* 2004, 90, 221–227.
5. Muthu, C.; Ayyanar, M.; Raja, N.; Ignacimuthu, S. Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India. *J. Ethnobiol. Ethnomed.* 2006, 2, doi:10.1186/1746-4269-2-43.
6. Gansané, A.; Sanon, S.; Ouattara, L.P.; Traoré, A.; Hutter, S.; Ollivier, E.; Azas, N.; Traore, A.S.; Guissou, I.P.; Sirima, S.B.; et al. Antiplasmodial activity and toxicity of crude extracts from alternatives parts of plants widely used for the treatment of malaria in Burkina Faso: Contribution for their preservation. *Parasitol. Res.* 2010, 106, 335–340.
7. Pietrovski, E.F.; Rosa, K.A.; Facundo, V.A.; Rios, K.; Marques, M.C.A.; Santos, A.R.S. Antinociceptive properties of the ethanolic extract and of the triterpene 3β,6β,16β-trihidroxilup-20(29)-ene obtained from flowers of *Combretum leprosum* in mice. *Pharmacol. Biochem. Behav.* 2006, 83, 90–99.
8. Rogers, C.B.; Verotta, L. Chemistry and Biological Properties of the African Combretaceae. In *Chemistry, Biological and Pharmacological Properties of African Medicinal Plants*; Hostettman, K., Chinyanganga, F., Maillard, M., Wolfender, J.L., Eds.; University of Zimbabwe Publications: Harare, Zimbabwe, 1996.

9. Bisoli, E.; Garcez, W.S.; Hamerski, L.; Tieppo, C.; Garcez, F.R. Bioactive pentacyclic triterpenes from the stems of *Combretum laxum*. *Molecules* 2008, 13, 2717–2728.

10. Banskota, A.H.; Tezuka, Y.; Kim, Q.T.; Tanaka, K.; Saiki, L.; Kadota, S. Thirteen novel cycloartane-type triterpenes from *Combretum quadrangulare*. *J. Nat. Prod.* 2000, 63, 57–64.

11. Ogan, A.U. The alkaloids in the leaves of *Combretum micranthum*. Studies on West African medicinal plants. VII. *Planta Med.* 1972, 21, 210–217.

12. Martini, N.D.; Katerere, D.R.P.; Eloff, J.N. Biological activity of five antibacterial flavonoids from *Combretum erythrophyllum* (Combretaceae). *J. Ethnopharmacol.* 2004, 93, 207–212.

13. Aderogba, M.A.; Kgatle, D.T.; McGaw, L.J.; Eloff, J.N. Isolation of antioxidant constituents from *Combretum apiculatum* subsp. *apiculatum*. *South Afr. J. Bot.* 2012, 79, 125–131.

14. Chaaibi, M.; Benayache, S.; Benayache, F.; N’Gom, S.; Koné, M.; Anton, R.; Weniger, B.; Lobstein, A. Triterpenes and polyphenols from *Anogeissus leiocarpus* (Combretaceae). *Biochem. Systemat. Ecol.* 2008, 36, 59–62.

15. Fyhruquist, P.; Mwasumbi, L.; Vuorela, P.; Vuorela, H.; Hiltunen, R.; Murphy, C.; Adlercreutz, H. Preliminary antiproliferative effects of some species of *Terminalia, Combretum* and *Pteleopsis* collected in Tanzania on some human cancer cell lines. *Fitoterapia* 2006, 77, 358–366.

16. Moura, M.D.; Silva, J.S.; Oliveira, R.A.G.; Diniz, M.F.F.M.; Barbosa-Filho, J.M. Natural products reported as potential inhibitors of uterine cervical neoplasia. *Acta Farm. Bonaerense* 2002, 21, 67–74.

17. Silva, J.S.; Moura, M.D.; Oliveira, R.A.G.; Diniz, M.F.F.; Barbosa-Filho, J.M. Natural product inhibitors of ovarian neoplasia. *Phytochemistry* 2003, 10, 221–232.

18. Quintans-Júnior, L.J.; Almeida, J.R.G.S.; Lima, J.T.; Nunes, X.P.; Siqueira, J.S.; Oliveira, L.E.G.; Almeida, R.N.; Athayde-Filho, P.F.; Barbosa-Filho, J.M. Plants with anticonvulsant properties—A review. *Rev. Bras. Farmacogn.* 2008, 18, 798–819.

19. Sousa, F.C.F.; Melo, C.T.V.; Citó, M.C.O.; Félix, F.H.C.; Vasconcelos, S.M.M.; Fonteles, M.M.F.; Barbosa-Filho, J.M.; Viana, G.S.B. Plantas medicinais e seus constituintes bioativos: Uma revisão da bioatividade e potenciais benefícios nos distúrbios da ansiedade em modelos animais. *Rev. Bras. Farmacogn.* 2008, 18, 642–654.

20. Almeida, R.N.; Navarro, D.S.; Barbosa-Filho, J.M. Plants with central analgesic activity. *Phytochemistry* 2001, 8, 310–322.

21. Pereira, J.V.; Modesto-Filho, J.; Agra, M.F.; Barbosa-Filho, J.M. Plant and plant-derived compounds employed in prevention of the osteoporosis. *Acta Farm. Bonaerense* 2002, 21, 223–234.

22. Rocha, L.G.; Almeida, J.R.G.S.; Macedo, R.O.; Barbosa-Filho, J.M. A review of natural products with antileishmanial activity. *Phytochemistry* 2005, 12, 514–535.

23. Barbosa-Filho, J.M.; Nascimento-Júnior, F.A.; Tomaz, A.C.A.; Athayde-Filho, P.F.; Silva, M.S.; Cunha, E.V.L; Souza, M.F.V.; Batista, L.M.; Diniz, M.F.F.M. Natural products with antileptoproct activity. *Rev. Bras. Farmacogn.* 2007, 17, 141–148.
24. Lima, G.R.M.; Montenegro, C.A.; Almeida, C.L.F.; Athayde-Filho, P.F.; Barbosa-Filho, J.M.; Batista, L.M. Database survey of anti-inflammatory plants in South America: A review. Int. J. Mol. Sci. 2011, 12, 2692–2749.

25. Souto, A.L.; Tavares, J.F.; Silva, M.S.; Diniz, M.F.F.M.; Athayde-Filho, P.F.; Barbosa Filho, J.M. Anti-inflammatory activity of alkaloids: An update from 2000 to 2010. Molecules 2011, 16, 8515–8534.

26. Mariath, I.R.; Falcão, H.S.; Barbosa-Filho, J.M.; Sousa, L.C.F.; Tomaz, A.C.A.; Batista, L.M.; Diniz, M.F.F.M.; Athayde-Filho, P.F.; Tavares, J.F.; Silva, M.S.; et al. Plants of the American continent with antimalarial activity. Rev. Bras. Farmacogn. 2009, 19, 158–192.

27. Falcão, H.S.; Mariath, I.R.; Diniz, M.F.F.M.; Batista, L.M.; Barbosa-Filho, J.M. Plants of the American continent with antiulcer activity. Phytomedicine 2008, 15, 132–146.

28. Mota, K.S.L.; Dias, G.E.N.; Pinto, M.E.F.; Luiz-Ferreira, A.; Souza-Brito, A.R.M.; Hiruma Lima, C.A.; Barbosa-Filho, J.M.; Batista, L.M. Flavonoids with gastroprotective activity. Molecules 2009, 14, 979–1012.

29. Falcão, H.S.; Leite, J.A.; Barbosa-Filho, J.M.; Athayde-Filho, P.F.; Chaves, M.C.O.; Moura, M.D.; Ferreira, A.L.; Almeida, A.B.A.; Souza-Brito, A.R.M.; Diniz, M.F.F.M.; et al. Gastric and duodenal antiulcer activity of alkaloids: A review. Molecules 2008, 13, 3198–3223.

30. Jesus, N.Z.T.; Falcão, H.S.; Gomes, I.F.; Leite, T.J.A.; Lima, G.R.M.; Barbosa-Filho, J.M.; Tavares, J.F.; Silva, M.S.; Athayde-Filho, P.F.; Batista, L.M. Tannins, peptic ulcer and related mechanisms. Int. J. Mol. Sci. 2012, 13, 3203–3228.

31. Ribeiro-Filho, J.; Falcão, H.S.; Batista, L.M.; Barbosa Filho, J.M.; Piuvezam, M.R. Effects of plant extracts on HIV-1 protease. Curr. HIV Res. 2010, 8, 531–544.

32. Agra, M.F.; Silva, K.N.; Basílio, I.J.L.D.; Freitas, P.F.; Barbosa-Filho, J.M. Survey of medicinal plants used in the region Northeast of Brazil. Rev. Bras. Farmacogn. 2008, 18, 472–508.

33. Silva, F.L.; Fischer, D.C.H.; Tavares, J.F.; Silva, M.S.; Athayde-Filho, P.F.; Barbosa-Filho, J.M. Compilation of secondary metabolites from Bidens pilosa L. Molecules 2011, 16, 1070–1102.

34. Barbosa-Filho, J.M.; Alencar, A.A.; Nunes, X.P.; Tomaz, A.C.A.; Sena-Filho, J.G.; Athayde Filho, J.G.; Falcão, H.S.; Chaves, M.C.O.; Moura, M.D.; Souza, M.F.V.; Cunha, E.V.L. Sources of alpha-, beta-, gamma-, delta- and epsilon-carotenes: A twentieth century review. Rev. Bras. Farmacogn. 2008, 18, 135–154.

35. Alves, J.S.; Castro, J.C.M.; Freire, M.O.; Cunha, E.V.L.; Barbosa-Filho, J.M.; Silva, M.S. Complete assignment of the 1H and 13C spectra of four triterpenes of the ursane, artane, lupine and friedelane groups. Magn. Reson. Chem. 2000, 38, 201–206.

36. Sena-Filho, J.G.; Duringer, J.; Maia, G.L.A.; Tavares, J.F.; Xavier, H.S.; da Silva, M.S.; da Cunha, E.V.L.; Barbosa-Filho, J.M. Ecdysteroids from Vitex species: Distribution and compilation of their 13C-NMR spectral data. Chem. Biodivers. 2008, 5, 707–713.

37. Oliveira, S.L.; Silva, M.S.; Tavares, J.F.; Sena-Filho, J.G.; Lucena, H.F.S.; Romero, M.A.V.; Barbosa-Filho, J.M. Tropane alkaloids from genus Erythroxylum: Distribution and compilation of 13C-NMR spectral data. Chem. Biodivers. 2010, 7, 302–326.

38. Palmeira-Junior, S.F.; Conserva, L.M.; Barbosa Filho, J.M. Clerodane diterpenes from Croton species: Distribution and a compilation of their and 13C-NMR. Nat. Prod. Commun. 2006, 1, 319–344.
39. Sena Filho, J.G.; Duringer, J.M.; Uchoa, D.E.A.; Xavier, H.S.; Barbosa Filho, J.M.; Braz Filho, R. Distribution of iridoid glucosides in plants from the genus *Lippia* (Verbenaceae): An investigation of *Lippia alba* (Mill.) N.E. Brown. *Nat. Prod. Commun.* **2007**, *2*, 715–716.

40. Lira, N.S.; Montes, R.C.; Tavares, J.F.; Silva, M.S.; Cunha, E.V.L.; Athayde-Filho, P.F.; Rodrigues, L.C.; Dias, C.S.; Barbosa-Filho, J.M. Brominated compounds from marine sponges of the genus *Aplysina* and a compilation of their $^{13}$C-NMR spectral data. *Mar. Drugs* **2011**, *9*, 2316–2368.

41. Honório Júnior, J.E.R.; Soares, P.M.; Melo, C.L.; Arruda Filho, A.C.V.; Sena Filho, J.G.; Barbosa-Filho, J.M.; Sousa, F.C.F.; Fonteles, M.M.F.; Leal, L.K.A.; Queiroz, M.G.R.; *et al*. Atividade farmacológica da monocrotalina isolada de plantas do gênero Crotalaria. *Rev. Bras. Farmacogn.* **2010**, *20*, 453–458.

42. Vasconcelos, S.M.M.; Honório-Júnior, J.E.R.; Abreu, R.N.D.C.; Silva, M.C.C.; Barbosa-Filho, J.M.; Lobato, R.F.G. Pharmacologic Study of Some Plant Species from the Brazilian Northeast: *Calotropis procera*, *Agava sisalana*, *Solanum paludosum*, *Dioscorea cayenensis* and *Crotalaria retusa*. In *Medicinal Plants: Classification, Biosynthesis and Pharmacology*; Varela, A., Ibañez, J., Eds.; Nova Science Publishers, Inc.: New York, NY, USA, 2009; Volume 4, pp. 189–202.

43. Vasconcelos, S.M.M.; Pereira, E.C.; Chaves, E.M.C.; Lobato, R.F.G.; Barbosa-Filho, J.M.; Patrocínio, M.C.A. Pharmacologic Study of *Amburana cearensis* and *Aniba genus*. In *Recent Progress in Medicinal Plants. Drug Plant IV*; Singh, V.K., Govil, J.N., Eds.; Studium Press LLC: Houston, TX, USA, 2010; Volume 30, pp. 51–64.

44. Barbosa-Filho, J.M.; Sette, I.M.F.; Cunha, E.V.L.; Guedes, D.N.; Silva, M.S. Protoberberine Alkaloids. In *The Alkaloids*; Cordell, G.A., Ed.; Elsevier: Amsterdam, The Netherlands, 2005; Volume 62, pp. 1–75.

45. Conserva, L.M.; Pereira, C.A.B.; Barbosa-Filho, J.M. Alkaloids of the Hernandiaceae: Occurrence and a Compilation of Their Biological Activities. In *The Alkaloids*; Cordell, G.A., Ed.; Elsevier: Amsterdam, The Netherlands, 2005; Volume 62, pp. 175–243.

46. Barbosa-Filho, J.M.; Cunha, E.V.L.; Gray, A.I. Alkaloids of the Menispermaceae. In *The Alkaloids*; Cordell, G.A., Ed.; Academic Press: San Diego, CA, USA, 2000; Volume 54, pp. 1–199.

47. Almeida, C.L.F.; Falcão, H.S.; Lima, G.R.M.; Montenegro, C.A.; Lira, N.S.; Athayde-Filho, P.F.; Rodrigues, L.C.; Souza, M.F.V.; Barbosa-Filho, J.M.; Batista, L.M. Bioactivities from marine algae of the genus *Gracilaria*. *Int. J. Mol. Sci.* **2011**, *12*, 4550–4573.

48. Le Grand, A.; Wondergem, P.A. Antiinfective phytotherapy of the savannah forests of Senegal (East Africa) I. An inventory. *J. Ethnopharmacol.* **1987**, *21*, 109–125.

49. Le Grand, A. Anti-infectious phytotherapy of the tree-savannah, Senegal (Western Africa) III: A review of the phytochemical substances and anti-microbial activity of 43 species. *J. Ethnopharmacol.* **1989**, *25*, 315–338.

50. Comley, J.C.W. New macrofilaricidal leads from plants? *Trop. Med. Parasitol.* **1990**, *41*, 1–9.

51. Tignokpa, M.; Laurens, A.; Mboup, S.; Sylla, O. Popular medicinal plants of the markets of Dakar (Senegal). *Int. J. Crude. Drug. Res.* **1986**, *24*, 75–80.

52. Malcolm, S.A.; Sofowora, E.A. Antimicrobial activity of selected Nigerian folk remedies and their constituent plants. *Lloydia* **1969**, *32*, 512–517.
53. Laurens, A.; Mboup, S.; Tignokpa, M.; Sylla O.; Masquelier, J. Antimicrobial activity of some medicinal species of Dakar markets. *Pharmazie* **1985**, *40*, 482–485.

54. Le Grand, A.; Wondergem, P.A.; Verpoorte, R.; Pousset, J.L. Anti-infectious phytotherapies of the tree-savannah of Senegal (West-Africa). Antimicrobial activity of 33 species. *J. Ethnopharmacol.* **1988**, *22*, 25–31.

55. Bassene, E.; Mahamat, B.; Lo, M.; Boye, C.S.B.; Faye, B. Comparison of the antibacterial activity of three Combretaceae: *Combretum micranthum*, *Guiera senegalensis* and *Terminalia avicennioides*. *Fitoterapia* **1995**, *66*, 86–88.

56. Adoum, A.O.; Dabo, N.T.; Fatope, M.O. Bioactivities of some savanna plants in the brine shrimp lethality test and *in vitro* antimicrobial assay. *Int. J. Pharmacog.* **1997**, *35*, 334–337.

57. Abreu, P.M.; Martins, E.S.; Kayser, O.; Bindseil, K.U.; Siems, K.; Seemann, A.; Frevert, J. Antimicrobial, antitumor and antileischmania screening of medicinal plants from Guinea-Bissau. *Phytomedicine* **1999**, *6*, 187–195.

58. Ferrea, G.; Canessa, A.; Sampietro, F.; Cruciani, M.; Romussi, G.; Bassetti, D. *In vitro* activity of a *Combretum micranthum* extract against Herpes simplex virus types 1 and 2. *Antiviral Res.* **1993**, *21*, 317–325.

59. Benoit, F.; Valentin, A.; Pelissier, Y.; Diafouka, F.; Marion, C.; Kone-Bamba, D.; Kone, M.; Mallie, M.; Yapo, A.; Bastide, J.M. *In vitro* antimalarial activity of vegetal extracts used in west african traditional medicine. *Am. J. Trop. Med. Hyg.* **1996**, *54*, 67–71.

60. Karou, D.; Dicko, M.H.; Sano, S.; Simpore, J.; Traore, A.S. Antimalarial activity of *Sida acuta* Burm. F. (Malvaceae) and *Pterocarpus erinaceus* Poir. (Fabaceae). *J. Ethnopharmacol.* **2003**, *89*, 291–294.

61. Ancolio, C.; Azas, N.; Mahiou, V.; Ollivier, E.; di Giorgio, C.; Keita, A.; Timon-David, P.; Balansard, G. Antimalarial activity of extracts and alkaloids isolated from six plants used in traditional medicine in Mali and Sao Tome. *Phytother. Res.* **2002**, *16*, 466–469.

62. Di Carlo, F.J.; Haynes, L.J.; Sliver, N.J.; Phillips, G.E. Reticuloendothelial system stimulants of botanical origin. *J. Reticuloendothel. Soc.* **1964**, *1*, 224.

63. Chika, A.; Bello, S.O. Antihyperglycaemic activity of aqueous leaf extract of *Combretum micranthum* (Combretaceae) in normal and alloxan-induced diabetic rats. *J. Ethnopharmacol.* **2010**, *129*, 34–37.

64. Keay, R.W.J. *Trees of Nigeria*. Clarendon Press: Oxford, UK, 1989; Volume 3, pp. 146–216.

65. McGaw, L.J.; Jager, A.K.; Staden, J.V. Antibacterial, anthelmintic and anti-amoebic activity in South African medicinal plants. *J. Ethnopharmacol.* **2000**, *72*, 247–263.

66. Fyhrquist, P.; Mwasumbi, L.; Haeggstrom, C.; Vourela, H.; Hiltunem, R.; Vurela, P. Ethnobotanical and antimicrobial investigation on some species of *Terminalia* and *Combretum* (Combretaceae) growing in Tanzania. *J. Ethnopharmacol.* **2002**, *79*, 169–177.

67. Bussmann, R.W.; Gilbreath, G.G.; Soilo, J.; Lutura, M.; Lutuluo, R.; Kunguru, K.; Wood, N.; Mathenge, S.G. Plant use of the Massai of Sekenani Valley, Massai Mara, Kenya. *J. Ethnobiol. Ethnomed.* **2006**, *2*, doi:10.1186/1746-4269-2-22.
68. Grønhaug, T.E.; Glæserud, S.; Skogsrud, M.; Ballo, N.; Bah, S.; Diallo, D.; Pualsen, B.S. Ethnopharmacological survey of six medicinal plants from Mali, West Africa. J. Ethnobiol. Ethnomed. 2008, 4, doi:10.1186/1746-4269-4-26.

69. Eloff, J.N. A sensitive and quick microplate method to determine the minimal inhibitory concentration of plant extracts for bacteria. Planta Med. 1998, 64, 711–713.

70. Geyid, A.; Abebe, D.; Debella, A.; Makonnen, Z.; Aberra, F.; Teka, F.; Kebede, T.; Urga, K.; Yersaw, K.; Biza, T.; et al. Screening of some medicinal plants of Ethiopia for their anti-microbial properties and chemical profiles. J. Ethnopharmacol. 2005, 97, 421–427.

71. Njume, C.; Jide, A.A.; Ndip, R.N. Aqueous and organic solvent-extracts of selected South African medicinal plants possess antimicrobial activity against drug-resistant strains of Helicobacter pylori: Inhibitory and bactericidal potential. Int. J. Mol. Sci. 2011, 12, 5652–5665.

72. Baba-Moussa, F.; Akpagana, K.; Bouchet, P. Antifungal activities of seven West African Combretaceae used in traditional medicine. J. Ethnopharmacol. 1999, 66, 335–338.

73. Masoko, P.; Picard, J.; Eloff, J.N. The antifungal activity of twenty-four Southern African Combretum species (Combretaceae). South Afr. J. Bot. 2007, 73, 173–183.

74. Lall, N.; Meyer, J.J.M. In vitro inhibition of drug-resistant and drug-sensitive strains of Mycobacterium tuberculosis by ethnobotanically selected South African plants. J. Ethnopharmacol. 1999, 66, 347–354.

75. Kloos, H.; Thiongo, F.W.; Ouma, J.H.; Butterworth, A.E. Preliminary evaluation of some wild and cultivated plants for snail control in Machakos District, Kenya. J. Trop. Med. Hyg. 1987, 90, 197–204.

76. Asres, K.; Bucar, F.; Knauder, E.; Yardley, V.; Kendrick, H.; Croft, S.L. In vitro antiprotozoal activity of extract and compounds from the stem bark of Combretum molle. Phytother. Res. 2001, 15, 613–617.

77. Ademola, I.O.; Eloff, J.N. In vitro anthelmintic activity of Combretum molle (R. Br. ex G. Don) (Combretaceae) against Haemonchus contortus ova and larvae. Vet. Parasitol. 2010, 169, 198–203.

78. Asres, K.; Balcha, F. Phytochemical screening and in vitro antimalarial activity of the stem bark of Combretum molle. Pharm. J. 1998, 16, 25–33.

79. Osore, H. Screening of selected medicinal plants for novel female regulating agents. Fitoterapia 1987, 58, 345–346.

80. Bessong, P.O.; Obi, C.L.; Andréola, M.L.; Rojas, L.B.; Pouységou, L.; Igumbor, E.; Meyer, J.J.M.; Quideau, S.; Litvak, S. Evaluation of selected South African medicinal plants for inhibitory properties against human immunodeficiency virus type 1 reverse transcriptase and integrase. J. Ethnopharmacol. 2005, 99, 83–91.

81. Ojewole J.A.O. Analgesic and anti-inflammatory effects of mollic acid glucoside, a 1α-hydroxycycloartenoid saponin extractive from Combretum molle R. Br. ex G. Don (Combretaceae) leaf. Phytother. Res. 2008, 22, 30–35.

82. Ojewole, J.A.O. Cardiovascular effects of mollic acid glucoside, a 1α-hydroxycycloartenoid saponin extractive from Combretum molle R Br. ex G. Don (Combretaceae) leaf. Cardiovasc. J. Afr. 2008, 19, 128–134.
83. Ojewole, J.A.O.; Adewole, S.O. Hypoglycaemic effect of mollic acid glucoside, a 1α-hydroxycycloartenoid saponin extractive from *Combretum molle* R. Br. ex G. Don (Combretaceae) leaf, in rodents. *J. Nat. Med.* **2009**, *63*, 117–123.

84. Asres, K.; Bucar, F. Anti-HIV activity against immunodeficiency virus type I (HIV-I) and type II (HIV-II) of compounds isolated from the stem bark of *Combretum molle*. *Ethiop. Med. J.* **2005**, *43*, 15–20.

85. Gelfand, M.; Mavis, S.; Drummond, R.B.; Ndemera, B. *The Traditional Medical Practitioner in Zimbabwe*; Mambo Press: Gweru, Zimbabwe, 1985.

86. Sohni, Y.R.; Kale, P.G. Mutagenicity of *Combretum erythrophyllum* in sex-linked recessive lethal test in Drosophila. *Phytother. Res.* **1997**, *11*, 524–526.

87. Hutchings, A.; Scott, A.H.; Lewis, G.; Cunningham, A.B. *Zulu Medicinal Plants: An Inventory*; University of Natal Press: Pietermaritzburg, South Africa, 1996.

88. Martini, N.; Eloff, J.N. The preliminary isolation of several antibacterial compounds from *Combretum erythrophyllum* (Combretaceae). *J. Ethnopharmacol.* **1998**, *62*, 255–263.

89. Eloff, J.N. It is possible to use herbarium specimens to screen for antibacterial components in some plants. *J. Ethnopharmacol.* **1999**, *67*, 355–360.

90. Sohni, Y.R.; Mutangadura-Mhlanga, T.; Kale, P.G. Bacterial mutagenicity of eight medicinal herbs from Zimbabwe. *Mutat. Res.* **1994**, *322*, 133–140.

91. Schwikkard, S.; Xhou, B.N.; Glass, T.E.; Sharp, J.L.; Mattern, M.R.; Johnson, R.K.; Kingston, D.G.I. Bioactive compounds from *Combretum erythrophyllum*. *J. Nat. Prod.* **2000**, *63*, 457–460.

92. Lindsey, K.; Jager, A.K.; Raidoo, D.M.; van Staden, J. Screening of plants used by Southern African traditional healers in the treatment of dysmenorrhoea for prostaglandin–synthesis inhibitors and uterine relaxing activity. *J. Ethnopharmacol.* **1999**, *64*, 9–14.

93. Asuzu, I.U.; Njoku, J.C. The pharmacological properties of the ethanolic root extract of *Combretum dolichopetalum*. *Phytother. Res.* **1992**, *6*, 125–128.

94. Asuzu, I.U.; Onu, O.U. Anti-ulcer activity of the ethanolic extract of *Combretum dolichopetalum* roots. *Int. J. Crude Drug Res.* **1990**, *28*, 27–32.

95. Udem, S.C.; Madubunyi, I.; Okoye, J.O.A.; Anika, S.M. Anti-hepatotoxic effects of the ethanolic extracts of *Combretum dolichopetalum* root bark and *Morinda lucida* leaf. *Fitoterapia* **1997**, *68*, 21–24.

96. Asuzu, I.U.; Adimorah, R.I. The antiinflammatory activity of extracts from the root of *Combretum dolichopetalum*. *Phytomedicine* **1998**, *5*, 25–28.

97. Udem, S.C.; Madubunyi, I.; Asuzu, I.U.; Anika, S.M. The trypanocidal action of the root extract of *Combretum dolichopetalum*. *Fitoterapia* **1996**, *67*, 31–37.

98. Lecompte, O. Museum National d'Histoire Naturlalle. *Flore du Cambodge, du Laos et du Vietnam* **1969**, 58–61.

99. Somanabandhu, A.; Wungchinda, S.; Wiwat, C. *Chemical Composition of Combretum Quadrangulare Kurz*, 4th ed.; Asian Symp. Med. Plants Spices: Bangkok, Thailand, 1980.

100. Ohsugi, M.; Basnet, P.; Kadota, S.; Ishii, E.; Tamura, T.; Okumura, Y.; Namba, T. Antibacterial activity of traditional medicines and an active constituent lupulone from *Humulus lupulus* against *Helicobacter pylori*. *J. Tradit. Med.* **1997**, *14*, 186–191.
101. Adnyana, I.K.; Tezuka, Y.; Banskota, A.H.; Tran, K.Q.; Kadota, S. Hepatoprotective constituents of the seeds of *Combretum quadrangulare*. Biol. Pharm. Bull. 2000, 23, 1328–1332.

102. Kiuchi, F.; Matsuo, K.; Itano, Y.; Ito, M.; Honda, G.; Oui, TK.; Nakajima Shimada, J.; Aoki, T. Screening of natural medicines used in Vietnam for trypanocidal activity against epimastigotes of *Trypanosoma cruzi*. Nat. Med. 2002, 56, 64–68.

103. Tewtrakul, S.; Miyashiro, H.; Nakamura, N.; Hattori, M.; Kawahata, T.; Otake, T.; Yoshinaga, T.; Fujiwara, T.; Supavita, T.; Yuenyongswad, S.; *et al.* HIV-1 integrase inhibitory substances from *Coleus parvifolius*. Phytother. Res. 2003, 17, 232–239.

104. Adnyana, I.K.; Tezuka, Y.; Awale, S.; Banskota, A.H.; Tran, K.Q.; Kadota, S. 1-O-galloyl-6-O-(4-hydroxy-3,5-dimethoxy)benzoyl-beta-D-glucose, a new hepatoprotective constituent from *Combretum quadrangulare*. Planta Med. 2001, 67, 370–371.

105. Adnyana, I.K.; Tezuka, Y.; Banskota, A.H.; Tran, K.Q.; Kadota, S. Three New triterpenes from the seeds of *Combretum quadrangulare* and their hepatoprotective activity. J. Nat. Prod. 2001, 64, 360–363.

106. Eldeen, I.M.S.; Vas Staden, J. *In vitro* pharmacological investigation of extracts from some trees used in Sudanese traditional medicine. South Afr. J. Bot. 2007, 73, 435–440.

107. Braga, F.C.; Wagner, H.; Lombardi, J.A.; De Oliveira, A.B. Screening the Brazilian flora for antihypertensive plant species for *in vitro* angiotensin-I-converting enzyme inhibiting. Phytomedicine 2000, 7, 245–250.

108. Serra, C.P.; Côrtes, S.F.; Lombardi, J.A.; Braga de Oliveira, A.; Braga, F.C. Validation of a colorimetric assay for the *in vitro* screening of inhibitors of angiotensin-converting enzyme (ACE) from plant extracts. Phytomedicine 2005, 12, 424–432.

109. Braga, F.C.; Serra, C.P.; Viana, N.S., Jr.; Oliveira, A.B.; Côrtes, S.F.; Lombardi, J.A. Angiotensin-converting enzyme inhibition by Brazilian plants. Fitoterapia 2007, 78, 353–358.

110. Wall, M.E.; Wani, M.C.; Brown, D.M.; Fullas, F.; Oswald, J.B.; Josephson, F.F.; Thornton, N.M.; Pezzuto, J.M.; Beecher, C.W.W.; Farnsworth, N.R.; *et al.* Effect of tannins on screening of plant extracts for enzyme inhibitory activity and techniques for their removal. Phytomedicine 1996, 3, 281–285.

111. Ampofo, O.F. Plants that heal. World Health 1977, 26–30.

112. McGaw, L.J.; Rabe, T.; Sparg, S.G.; Jager, A.K.; Eloff, J.N.; Van Staden, J. An investigation on the biological activity of *Combretum* species. J. Ethnopharmacol. 2001, 75, 45–50.

113. Simon, M.K.; Ajanusi, O.J.; Abubakar, M.S.; Idris, A.L.; Suleiman, M.M. The anthelmintic effect of aqueous methanol extract of *Combretum molle* (R. Br. x. G. Don) (Combretaceae) in lambs experimentally infected with *Haemonchus contortus*. Vet. Parasitol. 2012, doi:10.1016/j.vetpar.2011.12.022.

114. Sofowora, E.A. *Fip sections special: Section for the study of medicinal plants. V. West African traditional plant medicines*. Pharm. Int. 1982, 3, 137.

115. Waterman, C.; Smith, R.A.; Pontiggia, L.; DerMarderosian, A. Anthelmintic screening of Sub Saharan African plants used in traditional medicine. J. Ethnopharmacol. 2010, 127, 755–759.
116. Lamidi, M.; DiGiorgio, C.; Delmas, F.; Favel, A.; Eyele Mve-Mba, C.; Rondi, M.L.; Ollivier, E.; Nze-Ekekang, L.; Balansard, G. In vitro cytotoxic, antileishmanial and antifungal activities of ethnopharmacologically selected Gabonese plants. *J. Ethnopharmacol.* 2005, 102, 185–190.

117. Gessler, M.C.; Nkunyak, M.H.H.; Mwasumbi, L.B.; Heinrich, M.; Tanner, M. Screening Tanzanian medicinal plants for antimalarial activity. *Acta Tropica.* 1994, 56, 65–77.

118. Clarkson, C.; Maharaj, V.J.; Crouch, N.R.; Grace, O.M.; Pillay, P.; Matsabisa, M.G.; Bhagwandin, N.; Smith, P.J.; Folb, P.I. In vitro antiplasmodial activity of medicinal plants native to or naturalised in South Africa. *J. Ethnopharmacol.* 2004, 92, 177–191.

119. Elsheikh, S.H.; Bashir, A.K.; Suliman, S.M.; Wassila, M.E. Toxicity of certain Sudanese plant extracts on cercariae and miracidia of *Schistosoma mansoni*. *Int. J. Crude. Drug. Res.* 1990, 28, 241–245.

120. Sparg, S.G.; Van Staden, J.; Jager, A.K. Efficiency of traditionally used South African plants against schistosomiasis. *J. Ethnopharmacol.* 2000, 73, 209–214.

121. Bizimana, N.; Tietjen, U.; Zessin, K.H.; Diallo, D.; Djibril, C.; Melzig, M.F.; Clausen, P.H. Evaluation of medicinal plants from Mali for their in vitro and in vivo trypanocidal activity. *J. Ethnopharmacol.* 2006, 103, 350–356.

122. Cpleanu, F.; Hamburger, M.O.; Sordat, B.; Msonthi, J.D.; Gupta, M.P.; Saadou, M.; Hostettmann, K. Screening of tropical medicinal plants for mollusccidal, larvicidal, fungicidal and cytotoxic activities and brine shrimp toxicity. *Int. J. Pharmacog.* 1994, 32, 294–307.

123. Odda, J.; Kristensen, S.; Kabasa, J.; Waako, P. Larvicidal activity of *Combretum collinum* Fresen against *Aedes aegypti*. *J. Vector. Borne Dis.* 2008, 45, 321–324.

124. Olukoya, D.K.; Idika, N.; Odogbemi, T. Antibacterial activity of some medicinal plants from Nigeria. *J. Ethnopharmacol.* 1993, 39, 69–72.

125. Eloff, J.N. Which extractants should be used for the screening and isolation of antimicrobial components from plants. *J. Ethnopharmacol.* 1998, 60, 1–8.

126. Eldeen, I.M.S.; Vas Staden, J. Cyclooxygenase inhibition and antimycobacterial effects of extracts from Sudanese medicinal plants. *South Afr. J. Bot.* 2008, 74, 225–229.

127. Angeh, J.E.; Huang, X.; Sattler, I.; Swan, G.E.; Dahse, H.; Härtl, A.; Eloff, J.N. Antimicrobial and anti-inflammatory activity of four known and one new triterpenoid from *Combretum imberbe* (Combretaceae). *J. Ethnopharmacol.* 2007, 110, 56–60.

128. Asres, K.; Bucar, F.; Edelsbrunner, S.; Kartnig, T.; Hoger, G.; Thiel, W. Investigation on antimycobacterial activity of some Ethiopian medicinal plants. *Phytother. Res.* 2001, 15, 323–326.

129. Khan, M.N.; Ngassapa, O.; Matee, M.I.N. Antimicrobial activity of Tanzanian chewing sticks against oral pathogenic microbes. *Pharm. Biol.* 2000, 38, 235–230.

130. Steenkamp, V.; Fernandes, A.C.; Van Rensburg, C.E.J. Antibacterial activity of Venda medicinal plants. *Fitoterapia* 2007, 78, 561–564.

131. Regassa, F.; Araya, M. In vitro antimicrobial activity of *Combretum molle* (Combretaceae) against *Staphylococcus aureus* and *Streptococcus agalactiae* isolated from crossbred dairy cows with clinical mastitis. *Trop. Anim. Health Prod.* 2012, 44, 1169–1173.

132. Desta, B. Ethiopian traditional herbal drugs. Part II: Antimicrobial activity of 63 medicinal plants. *J. Ethnopharmacol.* 1993, 39, 129–139.
133. Mela, C. Investigation of the presence of substances having antibiotic action in higher plants. *Fitoterapia* **1950**, *21*, 98–99.

134. Sawhney, A.N.; Khan, M.R.; Ndaalio, G.; Nkunya, M.H.H.; Wevers, H. Studies on the rationale of African traditional medicine. Part II. Preliminary screening of medicinal plants for antigonococci activity. *Pak. J. Sci. Ind. Res.* **1978**, *21*, 189–192.

135. Almagboul, A.Z.; Bashir, A.K.; Karim, A.; Salih, M.; Farouk, A.; Khalid, S.A. Antimicrobial activity of certain Sudanese plants used in folkloric medicine. Screening for antifungal activity (VI). *Fitoterapia* **1988**, *59*, 393–396.

136. Steenkamp, V.; Fernandes, A.C.; Van Rensburg, C.E.J. Screening of Venda medicinal plants for antifungal activity against *Candida albicans*. *South Afr. J. Bot.* **2007**, *73*, 256–258.

137. Sawhney, A.N.; Khan, M.R.; Ndaalio, G.; Nkunya, M.H.H.; Wevers, H. Studies on the rationale of African traditional medicine. Part III. Preliminary screening of medicinal plants for antifungal activity. *Pak. J. Sci. Ind. Res.* **1968**, *21*, 193–196.

138. Pannangpetch, P.; Taejaernwiriaykul, O.; Kongyingyoes, B. Ethanolic extract of *Combretum decandrum* Roxb. decreases blood glucose level and oxidative damage in streptozotocin-induced diabetic rats. *Diab. Res. Clin. Pract.* **2008**, *79*, 107–108.

139. Recio, M.C.; Giner, R.M.; Manez, S.; Rios, J.L.; Marston, A.; Hostettmann, K. Screening of tropical medicinal plants for antiinflammatory activity. *Phytother. Res.* **1995**, *9*, 571–574.

140. Gouveia, M.G.; Xavier, M.A.; Barreto, A.S.; Gelain, D.P.; Santos, J.P.; Araújo, A.A.; Silva, F.A.; Quintans, J.S.; Agra, M.F.; Cabral, A.G.; *et al.* Antioxidant, antinociceptive, and anti-inflammatory properties of the ethanolic extract of *Combretum duarteanaum* in rodents. *J. Med. Food* **2011**, *14*, 1389–1396.

141. Hiermann, A.; Bucar, F. Influence of some traditional medicinal plants of Senegal on prostaglandin biosynthesis. *J. Ethnopharmacol.* **1994**, *42*, 111–116.

142. Olajide, O.A.; Modupemakinde, J.; Okpako, D.T. Evaluation of the anti-inflammatory property of the extract of *Combretum micranthum* G. Don (Combretaceae). *Inflammopharmacology* **2003**, *11*, 293–298.

143. Lira, S.R.S.; Almeida, R.N.; Almeida, F.R.C.; Oliveira, F.S.; Duarte, J.C. Preliminary studies on the analgesic properties of the ethanol extract of *Combretum leprosum*. *Pharm. Biol.* **2002**, *40*, 213–215.

144. Pettit, G.R.; Cragg, GM.; Singh, S.B. Antineoplastic agents, 122. Constituents of *Combretum caffrum*. *J. Nat. Prod.* **1987**, *50*, 386–391.

145. George, R.P.; Gordon, M.C.; Delbert, L.H.; Jean, M.S.; Prasert, L. Antineoplastic agents, 84. Isolation and structure of combretastatin. *Can. J. Chem.* **1982**, *60*, 1374–1376.

146. Ngaba, J.; Olschwang, D.; Giono-Barber, H.; Pousset, J.L. African medicinal plants. III study of antitussive action of *Combretum glutinosum* Perr. *Ann. Pharm. Fr.* **1980**, *38*, 529–536.

147. Pousset, J.L.; Rey, J.P.; Levesque, J.; Coursaget, P.; Galen, F.X. Hepatitis B surface antigen (HBSAG) inactivation and angiotensin-converting enzyme (ACE) inhibition *in vitro* by *Combretum glutinosum* Perr. (Combretaceae) extract. *Phytother. Res.* **1993**, *7*, 101–102.

148. Van Den Berghe, D.A.; Ieven, M.; Mertens, F.; Vlietinck, A.J.; Lammens, E. Screening of higher plants for biological activities. II. Antiviral activity. *J. Nat. Prod.* **1978**, *41*, 463–467.
149. Asres, K.; Bucar, F.; Kartnig, T.; Witvrouw, M.; Pannecoupe, C.; de Clercq, E. Antiviral activity against human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2) of ethnobotanically selected Ethiopian medicinal plants. *Phytother. Res.* **2001**, *15*, 62–69.

150. Bamgbose, S.O.A.; Dramane, K.L. Studies on *Combretum* species. II. Preliminary report on studies on four seeds of *Combretum* species. *Planta Med. Suppl.* **1977**, *32*, 350–356.

151. Akubue, P.I.; Mittal, G.C.; Aguwa, C.N. Preliminary pharmacological study of some Nigerian medicinal plants 1. *J. Ethnopharmacol.* **1983**, *8*, 53–63.

152. Dhar, M.L.; Dhar, M.N.; Dhawan, B.N.; Mehrrotra, B.N.; Sirimal, R.C.; Tandon, J.S. Screening of Indian plants for biological activity. Part IV. *Indian. J. Exp. Biol.* **1973**, *11*, 43–54.

153. Nascimento, S.C.; Chiappeta, A.A.; Lima, R.M.O.C. Antimicrobial and cytotoxic activities in plants from Pernambuco, Brazil. *Fitoterapia* **2003**, *74*, 339–344.

154. Simon, G.; Dewelle, J.; Nacoulma, O.; Guissou, P.; Kiss, R.; Daloze, D.; Braekman, J.C. Cytotoxic pentacyclic triterpenes from *Combretum nigricans*. *Fitoterapia* **2003**, *74*, 339–344.

155. Massele, A.Y.; Nshimo, C.M. Brine shrimp bioassay for biological activity of medicinal plants used in traditional medicines in Tanzania. *East Afr. Med. J.* **1995**, *72*, 661–663.

156. Sousa, M.P.; Rouquayrol, M.Z. Molluscicidal activity of plants from Northeast Brazil. *Rev. Bras. Pesq. Med. Biol.* **1974**, *7*, 389–394.

157. Bhakuni, O.S.; Dhar, M.L.; Dhar, M.M.; Dhawan, B.N.; Mehrotra, B.N. Screening of Indian plants for biological activity. Part II. *Indian J. Exp. Biol.* **1969**, *7*, 250–262.

158. Dhar, B.N.; Dubey, M.P.; Mehrotra, B.N.; Rastogi, R.P.; Tandon, J.S. Screening of Indian plants for biological activity. Part IX. *Indian J. Exp. Biol.* **1980**, *18*, 594–606.

159. Lima, G.R.M. Atividade gastroprotetora de *Combretum duarteanum* Cambess. (Combretaceae) em modelos animais. Dissertation for the Programa de Pós-Graduação em Produtos Naturais e Sintéticos Bioativos available at library (on-line) of Universidade Federal da Paraíba (UFPB): João Pessoa-Paraíba, Brazil, 2011.

160. Nunes, P.H.M.; Cavalcanti, P.M.S.; Galvão, S.M.P.; Martins, M.C.C. Antiulcerogenic activity of *Combretum leprosum*. *Pharmazie* **2009**, *64*, 58–62.

161. Brookes, K.B.; Doudoukina, O.V.; Katsoulis, L.C.; Veale, D.J.H. Uteroactive constituents from *Combretum kraussii*. *South Afr. J. Chem.* **1999**, *52*, 127–132.

© 2012 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (http://creativecommons.org/licenses/by/3.0/).