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Abstract

Ethnopharmacological relevance: *Acalypha* is the fourth largest genus of the Euphorbiaceae family with approximately 450 to 570 species. Several *Acalypha* species are used as medicinal plants in Africa and in the Mascarene Islands. Almost every part of the plant including the leaves, stem and roots are used as traditional remedies to treat and manage a panoply of ailments. However, there is no updated compilation of traditionally important medicinal plants from the *Acalypha* genus. The present review therefore, endeavours to provide for the first time an updated compilation of documented ethnopharmacological information in relation to the ethnomedicinal, ethnoveterinary, zoopharmacognosy, phytochemistry and biological activities of medicinal plants from the *Acalypha* genus which can subsequently open new perspectives for further pharmacological research.

Materials and methods: A literature search was performed on *Acalypha* species using ethnobotanical text books and scientific databases such as Pubmed, Scopus, EBSCO, Google Scholar and other web sources such as records from PROTA, PROSEA, and Botanical Dermatology Database. The Plant List, International Plant Name index and Kew Botanical Garden Plant name databases were used to validate scientific names.

Results and discussion: Plants from *Acalypha* genus are traditionally used in the treatment and/or management of diverse ailments such as diabetes, jaundice, hypertension, fever, liver inflammation, schistosomiasis, dysentery, respiratory problems including bronchitis, asthma and pheumonia as well as skin conditions such as scabies, eczema and mycoses. Approximately 124 species were listed in ethnobotanical studies with some botanical description and others mentioned from different web sources. However, only 40 species have been included in the present review due to the unavailability of ethnopharmacological data on the remaining species. Among the 40 cited species, 30 were traditionally used for the treatment and/or management of approximately 70 human diseases or health conditions. Two species, *A. alnifolia* and *A. fruticosa* are used as insecticides and sand fly repellent respectively. Only 2 species (*A. fruticosa* and *A. indica*) are used in ethnoveterinary practice and have similar human and veterinary applications. In zoopharmacognosy, only *A. ornata* has been mentioned. Natives from Africa, Central America, North America, Southern China, India, Bangladesh, Papua New Guinea and Mascarenes islands utilize *Acalypha* species as ethnomedicine. Traditionally used *Acalypha* species have been reported to possess at least one of the following biological activities: antimicrobial, anti-diabetic, antioxidant, anti-inflammatory, larvidal, pupicidal, hepatoprotective,

anticancer, leishmanicidal, antihyperglycemic, antihypertensive, anti-venom, analgesic, anthelmintic, antiemetic, laxative, expectorant, diuretic, post-coital antifertility effects and wound healing. A total of 167 compounds have been identified from 19 species, with 16 from eight species were reported to be bioactive.

Conclusion: The present review represents 32.3% of species from the *Acalypha* genus and can be considered as the first compilation of ethnopharmacologically useful plants from this genus. There is a great potential to discover new biologically active phytochemicals from the *Acalypha* genus because only few species have been studied comprehensively. Therefore, the clinical evaluation of species from this genus is warranted in future studies to confirm the ethnomedicinal claims and for the safety approval of therapeutic applications.

Keywords: *Acalypha*, Euphorbiaceae, medicinal plants, ethnopharmacological uses, phytochemicals.

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Chemical compounds studied in this article: Cyanoacetylurea (PubChem CID: 74055), phenol (PubChem CID: 996), 2-acetylfuran (Pubchem CID: 14505), myo-inositol (PubChem CID: 892), β-sitosterol (PubChem CID: 222284), daucosterol (PubChem CID: 5742590), emodin (PubChem CID: 3220), loliolide (PubChem CID: 100332), nicotinic acid (PubChem CID: 938), chrysophanic acid (PubChem CID: 10208), rutin (PubChem CID: 5280805), physcione (PubChem CID: 10639), butanedioic acid (PubChem CID: 1110), 1,2-benzenedicarboxylic acid (PubChem CID: 1017), oleanolic acid (PubChem CID: 1017), spinasterol (PubChem CID: 5281331), ursolic acid (PubChem CID: 64945), squalene (PubChem CID: 638072), n-hexadecanoic acid (PubChem CID: 985), eicosyltrichlorosilane (PubChem CID: 87771), quercetin 7-rutinoside (PubChem CID: 44259247), triacetonamine (PubChem CID: 13220), octadecanal (PubChem CID: 12533), quebrachitol (PubChem CID: 230881), phytol (PubChem CID: 5280435), vitamin E (PubChem CID: 2116), 2-hexenal (PubChem CID: 5281168), methyl tigate (PubChem CID: 5323652), propyl butyrate (PubChem CID: 7770), fenchene (PubChem CID: 28930), terpineol (PubChem CID: 17100), Z-ocimenone (PubChem CID: 6428432), 4-cresyl acetate (PubChem CID: 8797), eugenol (PubChem CID: 3314), perilla alcohol (PubChem CID: 10819), isopulegyl acetate (PubChem CID: 494311), linalyl acetate (PubChem CID: 8294), carvyl acetate (PubChem CID: 7335), α-copaene (PubChem CID: 25245021), α-ylangene (PubChem CID: 25243882), nonyl acetate (PubChem CID: 8918), isobutyl salicylate (PubChem CID: 6873), caryophyllene (PubChem CID: 5281515), longifolene (PubChem CID: 289151), β-humulene (PubChem CID: 5318102), cinnamyl acetate (PubChem CID: 5282110), ethyl vanillin (PubChem CID: 8467), geranyl acetate (PubChem CID:

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1.0. Introduction

Acalypha is the fourth largest genus of the Euphorbiaceae family. In some citations, this genus has been reported to encompass about 450 species (Schmelzer, 2007; Canales et al., 2011) while some reports mentioned that it consists of about 570 species (Iniaghe et al., 2009; Ikewuchi et al., 2011; Onocha et al., 2011a). Approximately 65 *Acalypha* species occur in tropical Africa and Madagascar while about 35 species occur in other Indian Ocean islands (Schmelzer, 2007). It encompasses of evergreen shrubs, trees and annuals from tropical to subtropical regions mainly in the tropics of Africa, America and Asia (Ahmed et al., 2012). The tribe is made up of several economical, ecological and ornamental groups of plants (Salodoye et al., 2008). The leaves of *Acalypha* species are succulent with sappy stalks which tend to lose sappiness with age. They are alternate, stipulate and are characterized with serrated edges, obvious mid-ribs and veins (Salodoye et al., 2008). The staminate flowers have 4 to 8 stamens and vermiform anthers. The pistillate flowers are often prominently bracteates with 3 sepals, 3 carpels, and 1 ovule per carpel and divided styles. Several *Acalypha* species share the characteristic of allomorphic pistillate flowers and fruits (Salodoye et al., 2008).

Most of the *Acalypha* species are used as medicinal plants in West and East Africa, especially in Nigeria (Emeka et al., 2012). Every part of the plant including the leaf, stem and roots are used in making mixtures and decoctions to treat various ailments. Some species namely *A. alnifolia* Klein ex Willd., *A. bipartita* Müll.Arg., *A. capitata* Willd., *A. ciliata* Forssk., *A. fruticosa* Forssk. and *A. segetalis* Müll.Arg. are used in food for consumption. *Acalypha* species such as *A. wilkesiana* Müll.Arg., *A. communis* Müll.Arg., *A. indica* L. and *A. ornata* Hochst. ex A.Rich. are utilized in folk medicine as diuretic, anthelmintic and for respiratory problems such as

bronchitis, asthma and pneumonia (Emeka et al., 2012). *A. wilkesiana*, *A. indica* and *A. hispida* Burm.f. are common species found in Mauritius while *A. integrifolia* Willd. subsp. *integrifolia var. integrifolia* is indigenous to the Mascarene Islands (Gurib-Fakim and Guého, 1996). The local people of Mauritius use leaves and whole plant of *A. indica* against skin infections such as scabies and dermatitis. *A. wilkesiana* is used to manage diabetes, dysentery and asthma. *A. integrifolia* is used as an astringent, purgative and to remove intestinal worms as well as cure various skin infections (Gurib-Fakim and Guého, 1996; Gurib-Fakim and Brendler, 2004).

2.0. Review methodology

Relevant literature was collected by probing scientific databases (Pubmed, Scopus, EBSCO, and Google Scholar) and other web sources such as records from PROTA, PROSEA, and the Botanical dermatology database. The review paper from Toyang and Verpoorte (2013) was used as guideline for the design of this study. Various keywords were used; *Acalypha* species, traditional uses, ethnomedicinal, ethnoveterinary and zoopharmacognostical uses, biological activities, isolated molecules and phytochemistry. Manual search of ethnobotanical textbooks and related compilations were also performed. The Plant List (www.plantlist.org), International Plant Name index (www.ipni.org), (IPNI) and Kew Botanical Garden Plant name databases (WCSP, 2014) were used to validate plant scientific names as well as confirm author names as described by Rivera et al., (2014) and Heinrich and Verpoorte (2014). Ambiguous or erroneous use of botanical nomenclature can invalidate otherwise valuable research findings as it will be impossible for readers to establish which organisms the observations relate to (Rivera et al., 2014). Taxonomy sets the standards for all economically important plants and is an indispensable tool for monitoring biodiversity in a changing world (Heinrich and Verpoorte, 2014). Information were gathered and summarized in Table form where appropriate. For instance, Table 1 provides the ethnomedicinal uses of the *Acalypha* species together with information in relation to the different parts of the plant used and the country where these species were recorded. Table 3 and 4 summarize the *in vitro* and *in vivo* assays of the species where the different tests, activities of the extracts and controls have been included.

3.0. Results and discussion

Results from plant name databases showed that The Plant List provided 1304 records, Kew Botanical Garden Plant name database gave 516 records while IPNI indicated 1584 records related to *Acalypha* genus. The records from these databases were quite confusing since each had different statistic. The Plant List database provided statistical data on the family as well as genus. It included 1187 scientific plant names of species from the genus *Acalypha* with the following status: 454 were accepted species names, 699 were synonym and 34 were inaccessible (The Plant List, 2013). Approximately 124 species were merely quoted in ethnobotanical studies with some botanical description and others mentioned from different web sources. However, only 40 species have been included in the present review due to unavailability of ethnopharmacological data on the remaining species. At present, no comprehensive documentation was found that have focussed on the ethnomedicinal uses, biological activities and phytochemistry of traditionally used medicinal plants from the *Acalypha* genus. Of the 40 cited species *A. indica* and *A. wilkesiana* have gained much attention and were reviewed by different authors (Ikewuchi et al., 2011; Saha and Ahmed, 2011; Sinha and Bandyopadhyay, 2012; Jagatheeswari et al., 2013; Lim et al., 2013). Much emphasis has been given to the *in vitro* and *in vivo* activities of both plants. To this effect, the present review can be considered as the first compilation of traditionally important medicinal plants from the *Acalypha* genus. The main objective is to provide scientific data on the ethnomedicinal, ethnoveterinary and zoopharmacognostical uses of *Acalypha* species geared towards its pharmacological activities, phytochemistry and isolated bioactive compounds. It is also anticipated that the present review will serve as the first comprehensive collation of ethnopharmacologically important plants from this genus which can be used as a repertoire for the selection of potential species with ethnomedicinal claims for future drug discovery programs.

Species from the *Acalypha* genus were found to be commonly used in folk medicine, ethnoveterinary medicine as well as zoopharmacognosy. Among the 40 cited species in the present study, 30 were reported to have uses in traditional medicine for the treatment and/or management of approximately 70 human diseases or health conditions. Two species, *A. alnifolia* and *A. fruticosa* are used as insecticides and sand fly repellent respectively. Only 2 species (*A. fruticosa* and *A. indica*) are used in ethnoveterinary practices, because they display similar medicinal properties in both human and animals. Only *A. ornata* was mentioned in zoopharmacognosy applications. Indigenous people from Africa, Central and North America,

Southern China, India, Bangladesh, Papua New Guinea and Mascarenes Islands utilize *Acalypha* species as ethnomedicine. Table 1 illustrates the ethnomedicinal uses of different species from the *Acalypha* genus, Table 2 summarizes the ethnoveterinary uses. Tables 3 and 4 depict the *in vitro* and *in vivo* activities on *Acalypha* species respectively. A large percentage (82.5%) of the *Acalypha* species (33) reviewed have been evaluated for biological activities and include *in vitro* (22 species), *in vivo* (10 species), as well as in clinical trial (1 species). Four plants namely *A. indica*, *A. hispida*, *A. fruticosa* and *A. wilkesiana* were cited the most. *A. wilkesiana* was reported to be effective for the treatment of *Tinea pedis*, *Pityriasis versicolor* and *Candida intetrigo* (Oyelami et al., 2003). Fourteen plants had no reported biological activities. Table 5 presents the bioactivities of the different plants mentioned in various citations. Tables 6 and 7 provide a summary of various phytochemicals reported from the genus *Acalypha* and include tannins, flavonoids, phenolics, saponins, alkaloids, terpenoids, coumarins, anthocyanins and anthraquinones and other bioactive compounds. Approximately 167 compounds were identified from 19 species and 16 compounds from eight species were found to be bioactive.

3.1. *Acalypha alnifolia* Klein ex Willd.

A. alnifolia is found in the wild in South India (Kovendan et al., 2012**).** The leaves are commonly used as leafy vegetable by the local people of Nilgiris (Revathi et al., 2013). The Irula tribes of Marudhamalai hills use this plant to combat dysentery (Revathi et al., 2013). The leaf juice mixed with boiled cow milk and consumed twice daily for up to 5 months is considered a good remedy against diabetes (Kovendan et al., 2012; Revathi et al., 2013). The smoke from burnt dried plant is used to control adult mosquito (Kamalakannan and Gopinath, 2013). Phytochemicals present in aqueous leaf extract include phenolics, tannins, flavonoids, phytosterols and cardiac glycosides (Revathi et al., 2013). Saponins were found to be absent from an aqueous extract but present in the methanol leaf extract (Evanjelene and Natarajan, 2013). Analysis of an acetone extract of *A. alnifolia* in GC-MC showed the presence of 9 compounds identified as cyanoacetylurea (used as a pharmaceutical intermediate), 4-(2-methylamino) ethyl pyridine (used as an antivertigo drug, for the treatment of atypical depression and in obesity management), 1-alanine, *n*-(1-oxopoenyl), methyl ester, 3,5-dimethyl-1-

dimethylphenylsilyloxybenzene, phenol, 4-4'-methylenebis(2,6-dimethyl) (used in fuel, polymers and lubricant blending industry, and also used as an antioxidant additive in petroleum-based lubricants), ethanone, 1-(4-methoxy-3-(4-methylphenoxy) phenyl, myo-inositol, 4-C-methyl, α-D- xylofuranoside, methyl-O-methyl (Revathi et al., 2013). Evangelene and Natarajan (2013) reported the antioxidant and antibacterial activities of methanol, aqueous, chloroform, ethyl acetate and petroleum ether extracts. Acetone and methanol extracts showed better antioxidant activities compared to non-polar extracts (Table 3).

3.2. *Acalypha alopecuroidea* Jacq.

This species is considered a weed and is traditionally used in Mayan medicine (Svačinova, 2011). It is native to Dominican Republic, Guatemala, Haiti, Venezuela, and also occurs in Bermuda, Mexico, Central America and the region from West Indies to Venezuela (Svačinova, 2011). The plant reduces flatulence and inflammation (Svačinova, 2011). Decoctions are used by Mopan and Itza-Maya peoples as washes to cure severe skin conditions (deep sores, ulcers, blisters, rashes, fungal infections and inflammations) and as herbal tea to treat stomach and urinary complaints (Madlener et al., 2009). It is also used in the treatment of asthma, infectious diarrhoea (Zavala-Sánchez et al., 2009), hyper-proliferative disorders and uterus cancer (Madlener et al., 2009). The latex content of the plant can cause dermatitis. Aqueous extracts of *A. alopecuroidea* exhibited anti-inflammatory and antiarthritic properties and was found to be effective as a remedy against both acute and chronic phase of inflammation (Table 4). In addition, the plant extract was able to inhibit the growth of some of enterobacteria (Zavala-Sánchez et al., 2009; Svačinova, 2011). Madelener et al., (2009) and Svačinova (2011) reported the anticancer activities of roots, leaves, stems and inflorescences after extraction with solvents of varying polarity. Methanol-tetrahydrofurane (MEOH-THF, 1:1) root extracts and fractions were active against various cancer cells namely human breast adenocarcinoma cell line (MCF-7), human leukaemic lymphoid cells (CEM) and human cervical carcinoma cells (HeLa). Two compounds were isolated during bioassay-guided fractionation namely 9-(3,6-dimethyl-hepta-2,6-dienyl)-hypoxantine) and 1,3,7,9-tetraethyl uric acid. However, the second compound was found to be inactive against most of the tested cell lines, with slight toxicity towards HeLa (IC_{50}= 178.9 µM) (Svačinova, 2011).

3.3. *Acalypha andringitrensis* Leandri.

A decoction of the aerial parts or stem bark of *Acalypha andringitrensis* and *Acalypha radula* Baill., both from Madagascar, is taken or inhaled to treat fever and syphilis. The crushed leaves are topically applied to treat scabies (Schmelzer, 2007a).

3.4. *Acalypha australis* L.

This species is an annual herb which occurs as an intruder in farmlands and road sides throughout southern China (Qiong, 2010). The whole plant is used in the treatment of dysentery, diarrhoea (Qiong, 2010), abdominal distension, uterus haemorrhage, dermatitis and eczema (Dong et al., 1994). It is also used as an expectorant. *Acalypha australis* is the main component of the Xian-Cai-Huang-Lian-Su capsules produced in China (Qiong, 2010). Folk medicinal practitioners of Bangladesh use the whole plant against diarrhoea. Flavonoids and phenols were identified to be the main chemical constituents of *A. australis* (Fan et al., 2012). Dong et al., (1994) isolated three compounds, australisin, β-sitosterol and daucosterol from the methanolic extract of the whole plant while Wang et al., (2008) identified 11 compounds from ethanolic extract of the aerial plant parts. These compounds were identified as emodin, β-sitosterol, loliolide, 2,6-dimethoxy-1,4-benzoquinone, nicotinic acid, protocatechuic acid, daucosterol, gallic acid, rutin, succinic acid and brevifolin.

Table 1: Ethnomedicinal uses of *Acalypha* species

***Acalypha* species**	**Part(s) used**	**Country**	**Use in ethnomedicine**	**Reference**
A. alnifolia Klein ex Willd.	L	Tamil Nadu, India	Dysentery	Senthilkumar et al., 2006
	L	Tamil Nadu, India	Diabetes	Kovendan et al., 2012; Revathi et al., 2013
	WP	NI	Insecticides	Kamalakannan and Gopinath, 2013
A. alopecuroidea Jacq.	NI	Central America	Severe skin conditions such as deep sores, ulcers, blisters, rashes, fungal infections and inflammations	Madlener et al., 2009
	NI	Central America	Stomach and urinary complaints	Madlener et al., 2009
	NI	Central America	Hyper-proliferative disorders and cancer of uterus	Madlener et al., 2009
	NI		Asthma, infection, diarrhea, inflammatory problems	Zavala-Sánchez et al., 2009
	NI	NI	Indigestion, dyspepsia, flatulence, asthma, bruises, sprains, infection, acute and chronic inflammations and cancer	Svačinova, 2011
A. andringitrensis Leandri.	AP, SB	Madagascar	Fever, syphilis	Schmelzer, 2007a
	L	Madagascar	Scabies	Schmelzer, 2007a
A. australis L.	WP	Southern China	Dysentery, diarrhea, abdominal distension, expectorant, uterus hemorrhage, dermatitis and eczema	Dong et al., 1994
	NI	NI	Dysentery, diarrhea	Qiong, 2010
	WP	Bangladesh	Diarrhea	Das et al., 2012
A. capitata Willd.	NI	Nigeria	Hypertension, hypercholesterolemia	Johnkennedy et al., 2011

A. ciliata Forssk.	L	Cote d'Ivoire	Female sterility	Aboaba et al., 2012
	L	Ghana	Sore dressing	Aboaba et al., 2012
	R	East Africa	Schistosomiasis	Aboaba et al., 2012
A. decaryana Leandri.	L	Madagascar	Purgative, dysentery	Schmelzer, 2007a
A. filiformis Poir.	WP	NI	Dysentery	Bosch, 2010
A. fimbriata Schumach. & Thonn.	L	Nigeria	Asthma, rheumatism, syphilis, ulcers	Quds et al., 2012
	F	NI	Diarrhea	
	NI	Nigeria	Asthma, cough, coryza	Essiett and Okoko, 2013
	L	Nigeria	Rabies	Essiett and Okoko, 2013
	L	NI	Post-partum pains	Essiett and Okoko, 2013
	R	NI	Laxative	Quds et al., 2012; Essiett and Okoko, 2013
	NI	Vangajjars	Warts	Essiett and Okoko, 2013
	NI	NI	Antidote, pain relief of scorpion and snakebites	Essiett and Okoko, 2013
A. fruticosa Forsk.	R, L	Tamil Nadu, India	Stomach ache, dyspepsia and given as antidote	Senthilkumar et *al.*, 2006
	NI	Tamil Nadu, India	Safe emetic and intestinal worms in children, scabies and other skin diseases, rheumatism	Bama et al., 2013
	NI	Kenya	Repellent against biting flies including sand flies	Ireri et al., 2010; Mong'are et al., 2012; 2013
	NI	Djibouti	Malaise, wounds, colds, fevers, infections, sores, tooth decays, hemorrhage, skin infections, diphtheria	Hassan-Abdallah et al., 2013
	L	India	Dyspepsia, colic, diarrhea, cholera, burns, bee stings, ophthalmic	Thambiraj et al., 2012
	WP	India	Cough, cold and headache	Thambiraj et al., 2012

	NI	India	Jaundice, fever, antidote	Thambiraj et al., 2012
	NI	NI	Stomach ache, digestive disorders, dyspepsia, colic and diarrhea	Lingathurai et al., 2011
	NI	NI	Dyspepsia, skin complaints, jaundice, cholera, sexually transmitted diseases, stomach problems, antipyretic, antidote, toothache	Thambiraj and Paulraj, 2011
	NI	NI	Dyspepsia, stomach ache, skin diseases, malaria, wounds and poisonous bites	Gopalakrishnan et al., 2010
	L, St	Yemen	Skin diseases, malaria and wound	Gopalakrishnan et al., 2010
	NI	Tanzania	Fungal infections, epilepsy	Gopalakrishnan et al., 2010
	L	NI	Stomach problems and swellings, eye infection, nose drops against cough and chest problems, scabies and sores	Gopalakrishnan et al., 2010
		NI	Venom antidote, stomach ache, dyspepsia and dermatitis	Rajkumar et al., 2010
	L, T	NI	Dyspepsia, colic, diarrhea, cholera	Senthilkumar and Dhandapani, 2009; Sivakumar et al., 2010
	R		Gonorrhea	Senthilkumar and Dhandapani, 2009
	NI	Kolli hills, South India	Cancer	Sivakumar et al., 2010
A. grandis Benth.	L	NI	Contraceptive	WHO, 2009; Vijayabhaskar et al., 2011; Jagatheeswari et al., 2013; Paindla and Mamidala, 2014; Vinothraja and Savitha, 2013
A. hispida Burm.f.	L	NI	Leprosy	Onocha et al., 2010; 2011a; 2011b; Bokshi et al., 2012
	L, F	NI	Laxative, diuretic, gonorrhea	Onocha et al., 2010; 2011a; 2011b; Bokshi et al., 2012
	RB	NI	Pulmonary problems	Bokshi et al., 2012
	AP	NI	Infectious diarrhea	Bokshi et al., 2012
	B	NI	Expectorant and asthma	Onocha et al., 2010; 2011a; 2011b

A. indica L.	WP	Tamil Nadu, India	Bronchitis in children	Senthilkumar et al., 2006
	L, R	Bangladesh	Diarrhea	Das et *al.*, 2012
	NI	Djibouti	Ganglions	Hassan-Abdallah et al., 2013
	NI	NI	Pneumonia, asthma, rheumatism	Paindla and Mamidala, 2014
	L	NI	Skin disorders, jaundices, piles, rheumatism ulcers, external skin eruptions, ring worms, eczema, pustules, insect bites	Paindla and Mamidala, 2014
	R	NI	Tonic, astringent, febrifuge and strong purgative, chest pain, joint pain, migraine, blood dysentery, decrease blood sugar level up to 30%	Paindla and Mamidala, 2014
	RB		Emollient, chilblains, insect bites, swelling rheumatism and facial paralysis	Paindla and Mamidala, 2014
	WP	India	Emmenagogue	Kumar et al., 2012
	L	Mauritius	Skin infection, vomitive	Gurib-Fakim, 2007
	R	Mauritius	Laxative, ear infection	Gurib-Fakim and Guého, 1996
A. integrifolia Willd. subsp. *integrifolia var. integrifolia*	L	Réunion, Mauritius	Astringent, purgative, intestinal worms, skin infections	Gurib-Fakim and Guého, 1996; Schmelzer, 2007a
A. lanceolata Willd.	L	Moluccas	Boils and swellings	Siregar, 2001a; IMPGC, 2003-10
	WP	Indo-China	Headache	Siregar, 2001a; IMPGC, 2003-10
	NI	Fiji	Vermicide, carminative, sores	Siregar, 2001a
A. lyallii Baker.	L	Madagascar, Comoros	Rheumatism	Gurib-Fakim and Brendler, 2004; Schmelzer, 2007a
A. mandonii Müll.Arg.	NI	Peru	Liver inflammation	Bussmann et al., 2011
	WP	Peru	Liver inflammation, clean blood from toxins	Bussmann et al., 2010
A. manniana Müll.Arg,	L	Cameroon	Mycosis and diseases	Noumedem et al., 2013

	L	Cameroon, Ivory Coast, Ghana, Uganda, Rwanda, Burundi	Diarrhea	Noumedem et al., 2013
A. monostachya Cav.	NI	San Rafael, Zapotitlan Salinas, Puebla, Mexico	Skin eruptions, wound healing, diarrhea	Canales et al., 2011
A. ornata Hochst. ex A.Rich.	L	Nigeria	Post-partum pains	Aboaba et al., 2012
	R	Tanganyika	Wounds, leprosy	Aboaba et al., 2012
	L	Tanganyika	Scabies in children	Aboaba et al., 2012; Quds et al., 2012
	NI	Tanganyika	Infections of the umbilicus of new-born babies	Aboaba et al., 2012
	L, R	Ubangi	Piles	Aboaba et al., 2012; Quds et al., 2012
A. phleoides Cav.	NI	Mexico	Diarrhea, colic, peptic ulcers, wounds and snake bite	Astudillo et al., 2004
A. psilostachya Hochst. Ex A.Rich.	L	Burundi, Central Africa	Eye drops, enema	Baerts and Lehmann, 1989
	St, L	Burundi, Central Africa	Inflammation of conjunctiva, eye drops, enema	Baerts and Lehmann, 1989
A. racemosa Wall. ex Baill.	L	Kwara State, Nigeria	Neonatal jaundice	Iniaghe et al., 2009
	L	Nigeria	Liver disorders, disease conditions resulting in jaundice	Iniaghe et al., 2008
A. radula Baill.	AP, SB	Madagascar	Fever, syphilis	Schmelzer, 2007a
	L	Madagascar	Scabies	Schmelzer, 2007a
A. spachiana Baill.	LS	Madagascar	Venereal diseases	Schmelzer, 2007a

A. siamensis Oliv. ex Gage.	L, F	Indo-China	Diuretic	Siregar, 2001b
	L	Thailand	Intestinal complaints	Siregar, 2001b
	L	NI	Worms, emetic, expectorant, febrifuge, fever, bowel complaints, kidney diseases	Ng and Songkhla, 2000; Siregar, 2001b
A. torta Pax & K.Hoffm.	NI	NI	Neonatal jaundice, diarrhea, skin disease	Onocha et al., 2011b
	NI	NI	Neonatal jaundice	Tauseef et al., 2013
	NI	Nigeria	Malaria, stomach upset, dermatitis, hypertension, bacterial and fungal infections	Ezekwesili and Nwodo, 2013
A. virginica L.	NI	NI	Diuretic	Pammel, 1911
A. villicaulis Hochst. ex A. Rich	L	Central Africa	High fever	Balagizi et al., 2005
A. wilkesiana Müll.Arg.	L	NI	Diabetes mellitus, gastrointestinal disorders, hypertension, malaria and skin infections	Quds et al., 2012
	St	South-West Nigeria	Breast tumors	Quds et al., 2012
	AP	Papua New Guinea	Abortifacient	Kumar et al., 2012
	L	Rodrigues	Pain	Gurib-Fakim and Guého, 1996
	L	Mauritius	Diabetes, dysentery, asthma	

L= Leaves, LS= Leafy stem, T= Twigs, RB= Root bark, R= Roots, F= Flower, St= Stem, SB= Stem bark, AP= Aerial part, WP= Whole plant, NI= Not indicated

3.5. *Acalypha bipartita* Müll.Arg.

This species is widely distributed in central and east Africa and is found in Democratic Republic of Congo, Rwanda, Burundi, Sudan, Kenya, Uganda and Tanzannia. Young leaves and shoots of the plant are consumed as a vegetable. They are chopped and added to cooking beans or peas which are served with a staple food. *A. bipartita* is also used as fodder and its stem is utilized to make baskets for winnowing and in construction of granaries. There are no reported medicinal uses for this species (Jansen, 2004).

3.6. *Acalypha brachystachya* Hornem.

Various chromatography techniques were used to isolate 17 compounds from the petroleum ether and chloroform fractions of the 95% ethanol extracts of the whole plant (Qiong, 2010). Thirteen of the compounds were fully characterized as chrysophanol, physcion, emodin, 1,2-benzenedicarboxylic acid, 1,2-dibutyl ester, 1,2-benzenedicarboxylic acid, 1,2-bis(2-methylpropyl) ester, lignoceric acid salicylate, spinasterol, oleanolic acid, ursolic acid, 3β-hydroxyolean-11-en-28,13β-olide and squalene on the basis of the analysis of physical and chemical properties using NMR and MS data (Qiong, 2010).

3.7. *Acalypha capitata* Willd.

A. capitata is traditionally used to manage hypertension in southern Nigeria (Johnkennedy et al., 2011). The leaves from some plants are consumed as vegetable and the aqueous extracts are utilized as tonic to treat hypercholesterolemia in southern Nigeria. In high cholesterol-fed rats, the aqueous extract showed a beneficial effect by lowering serum LDL-C, total cholesterol and triglyceride as well as increasing the HDL-C. Thus, the plant could be useful in the treatment of cardiovascular diseases (Johnkennedy et al., 2011).

3.8. *Acalypha ciliata* Forssk.

A. ciliata occurs widely in Africa where it is used as a vegetable and also used to feed animals (Aboaba et al., 2012). It also occurs in Yemen, Pakistan, India and Sri Lanka. In Cote d'Ivoire, decoction of the leaves is taken to treat female sterility. In Ghana, crushed leaves are applied as dressing to sores and root decoction is drunk to treat schistosomiasis in East Africa (Aboaba et al., 2012). The essential oil from the leaf of *A. ciliata* showed larvicidal and toxicity activities against *Anopheles gambiae* and *Artemia salina* (Aboaba et al., 2012).

Table 2: Ethnoveterinary uses of *Acalypha* species

Species	Part(s)used	Country	Use in Ethnomedicine	Reference
A. fruticosa Forssk.	L	Ethiopia	To treat contagious caprine pleuropneumonia (CCPP) in sheep	Giday and Teklehaymanot, 2013
	St	NI	Wounds	Gopalakrishnan et al., 2010; Thambiraj and Paulsamy, 2011
A. indica L.	WP	Ethiopia	Anthrax in cattle and camel	Giday and Teklehaymanot, 2013
	R, L	Andhra Pradesh, India	Roots and leaves are crushed in proportion of 1:2 ratios and administered to cattle along once daily for 5 days with food to treat intestinal worms	Bandyopadhyay and Mukherjee, 2005; Pragada and Rao, 2012; Lakshminarayan and Narasimharao, 2013
	L	Andhra Pradesh, India	Leaf paste is applied with pepper against skin diseases	Kiruba and Dhas, 2006; Lakshminarayan and Narasimharao, 2013
	L	Tamil Nadu, India	Leaves of the plant and seeds of *Acorus calamus* L. are ground and the extract is fed to animals to relief from vomiting	Eswaran et al., 2013
	L	Tamil Nadu, India	Leaves of *A. indica* L. and *Leucas aspera* (Willd.) Link, bulb of *Allium cepa* L. and seeds of *Piper nigrum* L. are ground and fed to animals to cure Black quarter disease	Eswaran et al., 2013
	L	Kalahandi district, Odisha, India	Leaf paste is mixed with lemon juice and applied on scabies area	Mallik et al., 2012
	NI	Coimbatore, India	Bovine mastitis in cattle	Mubarack et al., 2012
	L	Nizamabad district, India	Crushed leaves are applied to wounds externally till cured	Vijigiri and Sharma, 2012
	L	Tamil Nadu, India	Leaf paste is mixed with common salt and applied externally on wounded cow, goat and chicken	Selvaraju et al., 2011
	L	West Bengal, India	Constipation, maggot wound	Pandit, 2010

L	Andhra Pradesh, India	Leaf juice mixed with 5g of Ferula assa-foetida L. is used against constipation. A paste of few leaves, 4 black pepper and 3 cloves is applied externally to cure maggot wounds	Rao et al., 2008

L= Leaves, R= Roots, St= Stem, WP= Whole plant, NI= Not indicated

3.9. *Acalypha communis* Müll.Arg.

This species is used against skin disorders (Postigo et al., 2012). The authors reported the antifungal activity of the methanolic extract of the aerial part of the plant against yeasts (*Candida* and *Crytococcus* spp.), *Aspergillus* spp. (*A. flavus*, *A. fumigatus* and *A. niger*) and dermatophytes (*Microsporum* and *Trichophyton* genus). The MIC values against yeast and *Aspergillus* spp. were > 1000 µg/ml while the plant showed significant activity against dermatophytes with MIC values in the range of 250-500 µg/ml (Postigo et al., 2012). Antimicrobial cycloartane triterpenes isolated from aerial parts (Tables 6 and 7) inhibited the growth of vancomycin-resistant *Enterococcus* and methicillin-resistant *Staphylococcus* (Das et al., 2012).

3.10. *Acalypha decaryana* Leandri.

This species is distributed in Madagascar. An infusion of the leaves of the plant is drunk as a purgative and against dysentery by local people of Madagascar (Schmelzer, 2007a).

3.11. *Acalypha diversifolia* Jacq.

Nino et al., (2012) investigated the antibacterial and antifungal activities of hexane, dichloromethane (DCM) and methanol extracts of *A. diversifolia* against *Staphylococcus aureus* (ATCC 6538), *Bacillus subtilis* (ATCC 21556), *Klebsiella pneumonia* (ATCC 10031), *Escherichia coli* (ATCC 9637) and *Pseudomonas aeruginosa* (ATCC 27853), *Candida albicans* (ATCC 18804), *Aspergillus fumigatus* (ATCC 1022), and *Fusarium solani* (ATCC 11712). Hexane extract was inactive against all tested microorganisms. DCM gave MIC value of 1 mg/ml against *Fusarium solani* while methanol extract showed activity against *Pseudomonas aeruginosa* (MIC= 4 mg/ml). DCM extract contains tannins, flavonoids, sterols, saponins and alkaloids. Sterols and saponins were present in hexane extract while absent in methanolic extract (Nino et al., 2012).

Table 3: *In vitro* studies on *Acalypha* species

Species	Part used	Study/ assays	Activity	Reference
A. alnifolia Klein ex Willd.	L	Antioxidant-DPPH	IC_{50} (µg/ml): ME= 11.14±0.25, AE= 12.66±0.29, standard, rutin= 3.91±0.10	Evanjelene and Natarajan, 2013
	L	Antioxidant-Nitric oxide	IC_{50} (µg/ml): ME >1000, AE= 422.33±1.45, standard, rutin= 65.44±1.56	Evanjelene and Natarajan, 2013
	L	Antioxidant-Lipid peroxidation	IC_{50} (µg/ml): ME >1000, AE= >1000, standard, BHA= 3.91±0.10	Evanjelene and Natarajan, 2013
	L	Antioxidant-FRAP	IC_{50} (µg/ml): ME= 161±0.82, AE= 124±0.89, standard, AA= NI	Evanjelene and Natarajan, 2013
	L	Antimicrobial-Disc diffusion	Active against EC, ST, PA, KP, PV, BS, SP, SA	Evanjelene and Natarajan, 2013
	L	Antioxidant-Phosphomolybdenum (mg AA equivalence/g)	PE= 38.7±2.2, CE=83.9±4.3, AcE= 104.9±4.1, ME= 139.7±2.8, HWE= 82.9±6.4	Revathi et al., 2013
	L	Antioxidant-FRAP (Mmol equivalence of Fe (II)/mg)	PE= 31.9±0.22, CE= 51.5±0.8, AcE= 324.1±0.16, ME= 323.4±0.72, HWE= 146.9±0.76	Revathi et al., 2013
	L	Antioxidant-FRAP (µg equivalence of trolox/g)	PE= 973.6, CE= 3906.7, AcE= 39854.2, ME= 45902.7, HWE= 8078.5	Revathi et al., 2013
A. alopecuroidea Jacq.	R	Cytotoxicity(CEM cell lines)	IC_{50} = <0.4 and 0.9 mg/ml, MCF7 cell line: active	Madlener et al., 2009
	St	Cytotoxicity (CEM cell lines)	Least active	Madlener et al., 2009

	L	Cytotoxicity (CEM and MCF7 cell lines)	Active	Madlener et al., 2009
	R	Anticancer	IC_{50} (mg/mL) of ME-THF (1:1) against MCF-7= 1.1, CEM cells= 0.9. Fractions butanol: 127.5 for MCF-7, 15.3 for CEM and B23: 86.5 for MCF-7 and 0.5 for CEM	Svačinova, 2011
	NI	Antimicrobial	AE: inhibited some enterobacteria	Svačinova, 2011
	NI	Anti-inflammatory and antiarthritic	AE: active against acute and chronic phase of inflammation	Svačinova, 2011
A. ciliata Forssk.	L	Larvicidal and toxicity	LC_{50} (ppm) of EO against *Artemia salina*: 96.66 and *An. gambiae*: 73.96	Aboaba et al., 2012
A. communis Müll.Arg.	AP	Antimicrobial	Active against vancomycin-resistant *Enterococcus* and methicillin-resistant *Staphylococcus aureus* (MRSA)	Das et al., 2012
	AP	Antimicrobial	MIC (µg/ml): ME active against yeast and *Aspergillus* spp. >1000 and against dermatophytes = 250-500	Postigo et al., 2012
A. diversifolia Jacq.	AP	Antioxidant-DPPH	Inhibition: 32%	Mosquera et al., 2009
	AP	Antimicrobial	MIC (mg/ml): DCM= 1 against FS and ME= 4 against PA	Nino et al., 2012
A. fruticosa Forsk.	NI	Antidiarrheal, antioxidant, anti-inflammatory, anticancer, antiplasmodial, wound healing and cytotoxic	Active	Gopalakrishnan et al., 2010
	NI	Antimicrobial	Active	Sivakumar et al.,

	L	Antimicrobial	AE (100 mg/ml): active against SA, SP, SE and PV	2010 Senthilkumar and Dhandapani, 2009; Bama et al., 2013
	NI	Antibacterial using disk diffusion Antimicrobial using agar diffusion	ME (5 µg/ml): active against EC, VC, PM, PA and SA Zone of inhibition (mm) using ME (4 mg): 14 against SA, BS, 21 against MF, 12 against SE. Ampicillin (10 µg/disc): 25 against SA, 26 against BS and 30 against MF, not active against SE	Mothana et al., 2008
	NI	Antioxidant using DPPH	Radical scavenging activity of ME (0.1 mg/ml): 92.26 %	Mothana et al., 2008
	L	Anti-fecundity	ME, EA: Active against PD	Samuel et al., 2012
	L	Larvicidal and antifeedant	CE (5%): active with 92.8%, LC_{50}= 1.86%. Seventh fraction (1000 ppm): active with 84.3%, LC_{50}= 385.7 ppm	Lingathurai et al., 2011
A. gaumeri Pax & K.Hoffm.	L	Insecticidal and toxicity	% mortality of BT eggs: EE= 95±3.33, AE= 98±1.29, imidacloprid=100. LC_{50} (mg/mL): EE= 3.54 (3.31-3.76), AE= 0.39 (0.3-0.45). % nymphal mortality: EE=100, AE=3.3±2.53, imidacloprid=100	Cruz-Estrada et al., 2013
A. hispida Burm.f.	NI	Antimicrobial	Active against PA, SA, EC, and ST	Onacho et al., 2010
A. indica L.	NI	Antimicrobial	Silver nanoparticles: active against EC and VC	Das et al., 2012
	NI	Antimicrobial	Various solvent extracts: active against SA, SE, BC andSF	Das et al., 2012
A. lanceolata Willd.	L	Antimicrobial (Disc diffusion)	MIC (mm), ME (100 µg/ml): 12 against KP, 10 against SA, 21 against VD	Perumal Samy et al., 2013

A. macrostachya Jacq.	L	Antimicrobial	Inhibition (%) of CP by: EE=100, SWE=73, UWE=62	Ogbo and Oyibo, 2008
A. mandonii Müll.Arg.	NI	Antimicrobial, disk diffusion	Active- zone of inhibition: 11 mm against SA	Bussmann et al., 2010; 2011
A. manniana Müll.Arg.	L	Antibacterial and antidermatophytic	ME, HE, EA: active (MIC= 0.12- 2.04 mg/ml)	Noumedem et al., 2013
	L	Antioxidant	ME, HE, EA: IC_{50} = 3.34-4.8 µg/ml. Vitamin C, IC_{50} = 1.74 µg/ml	Noumedem et al., 2013
A. marginata (Poir.) Spreng.	L	Antimicrobial	MIC (µg/ml): 120 against LM and EC, 30 against SE, control- cytisoside and ampicillin: 16 and 24 respectively against LM, EC and SE	Diab et al., 2012
		Antioxidant, DPPH	% inhibition for CH and ME (50µg/ml): 29 and 89 % respectively	Moussa et al., 2011
A. monostachya Cav.	AP	Antimicrobial	HE: active against SA, SE, four strains of VC and ST with MIC > 2 mg/ml, ME: active against SA, SE, SI, BS and four strains of VC and ST with lowest MIC of VC Tor (1 mg/ml). MICs of chloramphenicol against SI, SA, VC strains: 1 µg/ml, against BS, SE, and ST: 2 µg/ml	Canales et al., 2011
	AP	Antioxidant, DPPH	ME: SC_{50}= 3.45 µg/ml	Canales et al., 2011
	AP	Toxicity, brine shrimp lethality using *A. Salina*	ME: toxic, LC_{50}= 4.5 µg/ml	Canales et al., 2011
A. ornata Hochst. ex A.Rich.	L	Toxicity	LC_{50} (ppm) of EO against AS: 93.77 and AG: 77.59	Aboaba et al., 2012
	L	Toxicity	LC_{50} (µg/ml) of EO against AS nauplii: 111.6	Onocha et al., 2011c

	L	Antibacterial	MIC (mg/ml) of HWE against clinical isolates: 52 against EC, 15 against PA, 4 against KB and 2 against PM. Tetracycline: 8 against EC, 30 against PA, 25 against KB and 56 against PM	Emeka et al., 2012
	L	Antibacterial	MIC (mg/ml) of ME against clinical isolates: 15 against PA, 6 against KB and 4 against PM. Tetracycline: 30 against PA, 25 against KB and 56 against PM	Emeka et al., 2012
	L	Antifungal	HWE: 11.3, 82.7and 86.7% growth inhibitions of TM for 10, 30 and 60 mg/ml and 10, 60, 74% growth inhibitions of TR for 10, 30, and 60 mg/ml respectively	Emeka et al., 2012
	L	Antifungal	ME (10, 30, and 60 mg/ml): 13.3, 84, 85.3% growth inhibitions for TM and 20, 60 and 58% growth reductions for TR	Emeka et al., 2012
		Antioxidant-DPPH	% Inhibition; at 10 µg/ml: EO= 20.5, ascorbic acid= 90.9, BHA= 95.42 and α-tocopherol= 15.4. At 20 µg/ml: EO= 14.8, ascorbic acid= 78.71, BHA= 94.31 and α-tocopherol= 12.4	Onocha et al., 2011c
A. phleoides Cav.	AP	Antispasmodic in isolated guinea-pig ileum	M-TCM (0.2-2.2 mg/ml): concentration dependent inhibition of contractions induced by 5-hydroxytryptamine but unable to inhibit contractions provoked by acetylcholine, histamine, KCl and $BaCl_2$	Astudillo et al., 2004
	AP	Antispasmodic in isolated rabbit jejunum	M-TCM (0.003-1.8 mg/ml): IC_{50}= 300±30 µg/kg. EO: IC_{50}= 53±11 µg/ml. Reference drug, Isoproterenol: IC_{50}= 12 x 10^{-2} ±2.5 x 10^{-2} µg/ml.	Astudillo et al., 2004
	AP	Bronchodilator in isolated guinea-pig trachea	Active: camphor and thymol (10^{-4}-10^{-2} M) from EO	Astudillo et al., 2004

A. platyphylla Müll.Arg.	NI	Antioxidant	IC_{50} (mg/l): HE= 269.45, DCM= 111.99 and ME= 189.17	
A. segetalis Müll.Arg.	WP	Toxicity	EO: LC_{50}= 14.0 µg/mL	Aboaba et al., 2010
	WP	Larvicidal	EO: LC_{50}= 45.4 µg/mL	Aboaba et al., 2010
A. siamensis Oliv. ex Gage	NI	Cytotoxicity using P388 murine leukemia cells	Active	Kambara et al., 2006
	L	Antimicrobial	Antibacterial: EA and ME. HE, DCM, EA, ME: not active against fungus	Wiart et al., 2004, Das et al., 2012
A. torta Muell.	L	Blood platelet aggregatory activity using human blood samples. Antithrombotic activity	EE (5 mg/ml): inhibited $CaCl_2$ induced platelet aggregation by 81.72%	Ezekwesili and Nwodo, 2013
	L	Cytotoxicity using brine shrimp assay	LC_{50} (µg/ml): HF = 6.90, EAF= 45.10, BF= 0.721 and ME= 0.0002	Onocha et al., 2011d
A. wilkesiana Müll.Arg.	L	Antimicrobial	Inhibition (%) of *Cercospora purpurea* by: EE=100, SWE=72, UWE=61	Ogbo and Oyibo, 2008
	NI	Antimicrobial	Active against SA and MRSA	Emeka et al., 2012

B= Bark, L= leaf, S= Seed, St= stem, R= Roots, WP= Whole plant, F= fraction, EA= Ethyl acetate, HE= Hexane extract, ME= Methanolic extract, M-TCM= MEOH-$CHCl_3$, THF= tetrahydrofurane CE: Chloroform extract, AE= Aqueous extract, EE= Ethanolic extract, SWE= Sterilized water extract, UWE= Unsterilized water extract, PE= Petroleum ether, AcE= Acetone extract, HWE= Hot water extract, HF= hexane fraction, EAF= Ethyl acetate fraction, BF= butanol fraction MCF-7= Human breast adenocarcinoma, CEM= Acute lymphoblastic leukemia cancer cells, AA= Ascorbic acid, NI= Not indicated, EO= Essential oil, PA= *Pseudomonas aeruginosa*, EC= *Escherichia coli*, SA= *Staphylococcus aureus*, MRSA: Methicillin-resistant *Staphylococcus aureus*, PD= *Plebotomus duboscqi*, BT= *Bemisia tabaci*, CP= *Cercospora purpurea*, ST= *Salmonella typhii*, SE= *Staphylococcus epidermis*, VC= *Vibrio cholera*, KP= *Klebsiella pneumonia*, PM= *Proteus mirabilis*, PV= *Proteus vulgaris*, BS= *Bacillus subtilis*, SP= *Streptococcus pneumonia*, FS= *Fusarium solani*, MF= *Micrococcus flavus* , AS= *Artemia salina*, AG= *Anopheles gambiae*, TM= *Trichophyton mentagrophytes*, TR= *Trichophyton rubrum*.

3.12. *Acalypha filiformis* Poir.

This species is distributed in various islands of the Indian Ocean except Seychelles (Bosch, 2010). The flexible stems and branches of the plant are used in Madagascar to make baskets and fish traps. Whole plant decoction is taken three times per day against dysentery. Phytochemical screening showed the presence of tannins and anthocyanins in the root bark, stem bark and leaves. Alkaloids and saponins are present in the leaves (Bosch, 2010).

3.13. *Acalypha fimbriata* Schumach. & Thonn.

A. fimbriata originates from Oceania and has spread all over the world. The flowers of the plant are used in the treatment of diarrhoea (Essiet and Okoko, 2013). In Nigeria, the plant is used against asthma, cough, coryza and the leaves are compounded with the leaves of other medicinal plants to treat rabies in children (Essiet and Okoko, 2013). Cooked leaves are taken to relieve post-partum pains and root decoction acts as a laxative (Essiet and Okoko, 2013). The leaves are also used in rheumatism, syphilis, ulcers in Nigeria and have been reported to possess anthelmintic and antimicrobial activities (Quds et al., 2012). Ethanolic leaf extract of the plant has been reported to contain saponins, tannins, flavonoids and cardiac glycosides while the ethanolic extract of the stem showed the absence of saponins (Essiet and Okoko, 2013). The nutritional composition (% w/w) of the leaves included moisture content (10.8), ash content (11.5), acid-insoluble ash (3.0), protein (9.5), fat (25) and carbohydrate (1.5) (Essiet and Okoko, 2013).

Table 4: *In vivo* activities of *Acalypha* species

Species	Part used	Study	Activity/Results	Reference
A. alopecuroidea Jacq.	AP	Anti-inflammatory, Carrageenan-induced paw edema Anti-inflammatory, Cotton pellet-induced granuloma	ME (200 mg/kg) decrease paw volume by 82.2±4% after 96h, with indomethacin (4 m/kg), paw volume was reduced by 37.9±8.2% AE (200 mg/kg) reduced edema by 70.6±6.6% and naproxen (25 mg/kg) by 46.1±7.1%	Zavala-Sánchez et al., 2009 Zavala-Sánchez et al., 2009
A. capitata Willd.	L	Hypolipidemic effects in rats	Control rats: CH (mmol/L)= 1.86±0.11, TR (mmol/L)= 1.79±0.05, HDL-C (mmol/L)= 1.09± 0.01, LDL-C (mmol/L)= 0.25±0.00. AE (200 mg/ml) given to normal rats: CH (mmol/L)= 1.80±0.13, TR (mmol/L)= 1.73±0.04, HDL-C (mmol/L) = 1.14± 0.01), LDL-C (mmol/L)= 0.19±0.00. CH (0.4 mg/0.2 mL) fed rats: CH (mmol/L)= 2.91±0.16, TR (mmol/L)= 2.43±0.06, HDL-C (mmol/L)= 0.02± 0.02), LDL-C (mmol/L)= 0.31±0.01. CH (0.4 mg/0.2 mL) fed rats treated with AE (200 mg/ml): CH (mmol/L)= 1.91±0.16, TR (mmol/L)= 1.84±0.08, HDL-C (mmol/L)= 0.87± 0.02), LDL-C (mmol/L)= 0.26±0.01	Johnkennedy et al., 2011
A. fimbriata Schumach. & Thonn.	L, St	Antiemetic in chicks	ME: Inhibition: L= 44.42% and St= 35.04%	Quds et al., 2012
A. fruticosa Forssk.	L	Anti-inflammatory in rats	ME: Active	Schmelzer, 2007b
A. indica L.	L	Wound healing using rats	EE: Active	Moorthy et al., 2012
A. ornata Hochst. ex	L, St	Antiemetic in chicks	ME: Inhibition: L= 94.51% and St= 65.64%	Quds et al.,

A.Rich.				2012
A. phleoides Cav.	AP	Intestinal motility in mice	M-TCM (1:1): decreased gastrointestinal transit from 72.92% ±3.37% to 53.44% ±3.55% (Dose: 1-300 mg/kg). Atropine (1 mg/kg): reduced GI transit to 58.69% ± 2.24%.	Astudillo et al., 2004
A. racemosa Wall. ex Baill.	L	Hepatoprotective & antioxidant: effects on serum uncongugated bilirubin levels (µmol/L) in rats	Control, DW= 4.5±0.13, CCl_4 (1.5 ml/kg) only= 8.5±0.25, CCl_4 and 60 mg/kg ME= 5.6±0.2, CCl_4 and 120 mg/kg ME= 5.8±0.3	Iniaghe et al., 2008
		Hepatoprotective & antioxidant: effects on serum total bilirubin conc. (µmol/L) in rats	Control, DW= 7.4±0.24, CCl_4 (1.5 ml/kg) only= 8.1±0.25, CCl_4 and 60 mg/kg ME= 8.1±0.32, CCl_4 and 120 mg/kg ME= 7.2±0.67	Iniaghe et al., 2008
		Hepatoprotective & antioxidant: effects on serum albumin conc. (g/L) in rats	Control, DW= 26.0±1.0, CCl_4 (1.5 ml/kg) only= 18.5±0.9, CCl_4 and 60 mg/kg ME= 19.0±0.3, CCl_4 and 120 mg/kg ME= 23.0±1.0	Iniaghe et al., 2008
		Hepatoprotective & antioxidant: effects on serum total protein conc. (g/L) in rats	Control, DW= 46.0±3.0, CCl_4 (1.5 ml/kg) only= 34.0±3.2, CCl_4 and 60 mg/kg ME= 36.0±3.0, CCl_4 and 120 mg/kg ME= 45.0±2.3	Iniaghe et al., 2008
		Hepatoprotective & antioxidant: effects on liver total protein conc. (mg/mL) in rats	Control, DW= 4.57±0.16, CCl_4 (1.5 ml/kg) only= 3.65±0.11, CCl_4 and 60 mg/kg ME= 3.73±0.16, CCl_4 and 120 mg/kg ME= 4.97±0.22	Iniaghe et al., 2008

A. torta Muell.	L	Antidiarrhoeal activity using rabbit gut	Height of contraction: 0.80 ± 0.03 cm. EE (2.5 mg): increased height to 1.7 ± 0.4. Histamine (0.002 µg) abolished contraction, acetylcholine (0.002 µg) enhanced contraction. EE (10 mg): antagonizes the actions of acetylcholine	Ezekwesili and Nwodo, 2013
	L	Anti-hypertensive	EE: dose dependent decrease in arterial blood pressure of anesthetized cats	Ezekwesili et al., 2012
	L	Anti-hypertensive	EE: inhibited adrenaline induced contraction of isolated rabbit aortic strips	Ezekwesili et al., 2012
	L	Anti-hypertensive	EE: dose-dependent increase in the rate of flow of physiologic fluid through the rat hind-quarters preparation	Ezekwesili et al., 2012
A. wilkesiana cv. godseffiana	L, St	Antiemetic in chicks	ME: Inhibition: L= 94.51% and St= 65.64%	Quds et al., 2012

AP= Aerial part, L= Leaves, St= Stem, ME= Methanolic extract, AE= Aqueous extract, EE= Ethanolic extract, DW= Distilled water, HDL-C= High density lipoprotein cholesterol (COD 11523), LDL-C= Low density lipoprotein cholesterol (COD 11579), CH= Cholesterol, TR= Triglyceride, M-TCM = Methanol-chloroform, CCl_4= Carbon tetrachloride

3.14. *Acalypha fruticosa* Forssk.

A. fruticosa occurs from east of Sudan to Somalia and south through east Africa and Democratic Republic Congo to southern Africa (Schmelzer, 2007b). It is also found in Yemen, southern India, Sri Lanka and Myanmar (Schmelzer, 2007b). In Tanzania, the leafy shoots of the plant are eaten as a vegetable. In East Africa, it is an important fodder plant for sheep. In Ethiopia, the dried leaves are used as a substitute for tea (Schmelzer, 2007b). The leaves, roots, stem and whole plant of this species have been reported to possess medicinal properties (Table 1). The whole plant is used to cure cough, cold and headache. The leaves are used against dyspepsia, colic, diarrhoea (Thambiraj et al., 2012) and cholera (Senthilkumar and Dhandapani, 2009). A leaf infusion is taken as vulnerary to wash pustules (Senthilkumar and Dhandapani, 2009) and in the treatment of ophthalmia (Thambiraj et al., 2012). In Tanzania, it is used to treat fungal infection and a leaf decoction is drunk against epilepsy (Gopalakrishnan et al., 2010). In Tamilnadu, half spoon leaf juice is given to children as a safe emetic and against intestinal worm. Fresh leaf juice may be employed in scabies and against other skin diseases, and when taken with lime and onion is a good stimulating application in rheumatism (Bama et al., 2013). The aqueous leaf extract contained alkaloids, carbohydrates, phytosterols, saponins, gums and mucilages (Senthilkumar and Dhandapani, 2009). GC-MS analysis showed the presence of 1, 2-benzenedicarboxylic acid, diisooctyl ester, *n*-hexadecanoic acid and 9, 12-octadecadienoic acid from ethanolic extract of the aerial part while α-D-glucopyranoside and eicosyltrichlorosilane were identified from petroleum ether extract (Gopalakrishnan et al., 2010). Methanolic extract of the plant showed antioxidant and antimicrobial activities against *Staphylococcus aureus*, *Bacillus subtilis*, *Myotis flavus* and *Staphylococcus epidermis* (Mothana et *al.*, 2008). Senthikumar and Dhandapani (2009) reported that the aqueous leaf extract (100 mg/ml) showed antimicrobial activity against *Staphylococcus aureus*, *Streptococcus pyogene*, *Staphylococcus epidermis*, *Proteus vulgaris*, *Escherichia coli* and *Candida albicans*. The methanol leaf extract showed antioxidant activity *in vitro* and anti-inflammatory activity in rats (Schmelzer, 2007b). Methanol and ethyl acetate crude leaf extracts were found to be effective in reducing the fecundity of *Phlebotomus duboscqi* (Samuel et al., 2012). Lingathurai et al., (2011) reported the antifeedant and larvicidal activities of hexane, chloroform and ethyl acetate leaf extracts of the plant against *Plutella xylostella* larvae. The results showed that chloroform extract had maximum antifeedant activity of 92.8%. The seventh fraction from chloroform extract displayed maximum antifeedant activity of 84.3% at a concentration of 100 ppm with LC_{50} value of 385.7 mg/L against the third instar larvae of *Plutella xylostella*. The active fraction showed the presence of terpenoids, tannins, coumarins, anthraquinones and saponins (Lingathurai et al., 2011).

Table 5: Other reported biological activities of *Acalypha* species

Species	Part used	Activities mentioned	References
A. alnifolia Jacq.	NI	Antibacterial, antifungal, antioxidant	Noumedem et al., 2013
A. alopecuroidea Jacq.	NI	Anodyne, carminative, diuretic, sedative. Vulnerary and energizing effects	Svačinova, 2011
	NI	Antioxidant, antimicrobial and cytotoxic	Madlener et al., 2009
A. grandis Benth	L	*In vitro* antiprotozoal	Das et al., 2012
A. fimbriata Schumach. & Thonn.	L	Anthelmintic, antimicrobial	Quds et al., 2012
A. fruticosa Forssk.	NI	Antioxidant, antimicrobial and cytotoxic	Madlener et al., 2009
	L	Antioxidant	Schmelzer, 2007b
A. gaumeri Pax & K.Hoffm.	R	Antimicrobial	Marcela et al., 2008
A. hispida Burm.f.	L	Antifungal, antibacterial, anti-ulcer and anti-tumor	Onocha et al., 2011a
	NI	Antifungal	Onocha et al., 2010
	L	Antifungal	Iniaghe et al., 2009; Noumedem et al., 2013
	NI	Antibacterial, antioxidant	Noumedem et al., 2013
A. indica L.	L	Anti-periodic and laxative	Paindla and Mamidala, 2014
	NI	Antibacterial	Evanjelene and Natarajan, 2013
	NI	Antioxidant, antiepileptic, possible analgesic and anti-inflammatory	Emeka et al., 2012
A. lanceolata Willd.	L	Antiseptic, vermicide	IMPGC, 2003-10
	WP	Carminative	IMPGC, 2003-10
A. monostachya Cav.	NI	Antibacterial, antifungal, antioxidant	Noumedem et al., 2013
A. ornata Hochst. ex A.Rich.	L, R	Molluscidal	Aboaba et al., 2012
A. phleoides Cav.	NI	Antiprotozoal against *Entamoeba histolytica* and *Giardia lamblia*	Astudillo et al., 2004
A. platyphilla Müll.Arg.	NI	Antioxidant, antimicrobial and cytotoxic	Madlener et al., 2009
A. racemosa Wall. ex Baill.	L	Antimicrobial	Iniaghe et al., 2009

A. siamensis Oliv. ex Gage.	NI	Antibacterial	Evanjelene and Natarajan, 2013
	L	Antipyretic	Ng and Na Songkhla, 2000
	NI	Antioxidant, antimicrobial and cytotoxic	Madlener et al., 2009
A. torta Pax & K.Hoffm.	NI	Antibacterial	Evanjelene and Natarajan, 2013
	L	Antimicrobial, hypolipidaemic, anti-inflammatory and antihypertensive	Ezekwesili and Nwodo, 2013
A. wilkesiana Müll.Arg.	NI	Antimycotic, antibacterial, anti-inflammatory, hemostatic, anthelmintic, analgesic	Onocha et al., 2011b
	NI	Antibacterial, antifungal, antioxidant,	Noumedem et al., 2013
	L	Antihypertensive, antimicrobial, diuretic, hypoglycaemic, hypolipidaemic	Quds et al., 2012
	NI	Antioxidant, antiepileptic, possible analgesic and anti-inflammatory	Emeka et al., 2012
	NI	Antibacterial	Evanjelene and Natarajan, 2013
	NI	Antioxidant, antimicrobial and cytotoxic	Madlener et al., 2009

L= Leaves, R= Roots, WP= Whole plant, NI= Not indicated

3.15. *Acalypha gaumeri* Pax & K.Hoffm.

Cruz-Estrada et al., (2013) reported the insecticidal activity of aqueous and ethanolic leaf extracts of *A. gaumeri* against *Bemisia tabaci* eggs and nymphs. The activity was significant for ethanolic extract with LC_{50} 3.54 mg/mL and 100% nymphal mortality. Marcela et al., (2008) revealed the antimicrobial properties of roots of the plant against some pathogen strains.

3.16. *Acalypha grandis* Benth.

The leaf methanolic extract of *A. grandis* showed *in vitro* antiprotozoal activity (Das et al., 2012). The leaves of the plant have been reported to have contraceptive activity (Vinothraja and Savitha, 2013; Paindla and Mamidada, 2014).

3.17. *Acalypha hispida* Burm.f.

A. hispida is commonly known as 'chenille plant' and is native to New Guinea, the Malay Archipelago and other islands in the East Indies (Bokshi et al., 2012). Leaf poultice of the plant is

used against leprosy. Leaf and flower decoction is taken internally as laxative, diuretic and to treat gonorrhoea. Root bark is used for pulmonary problems. A decoction from the aerial part of the plant is used in the treatment of infectious diarrhea and dysentery (Bokshi et al., 2012). The plant is also used as an expectorant in asthma and against kidney ailments (Onocha, 2010).

Phytochemical screening of aqueous and methanolic leaf extract of the plant showed the presence of phenolics, flavonoids, glycosides, steroids, saponins, phlobatannins and hydroxyanthraquinones. Isolated compounds from the plant include gallic acid, corilagin, cycloartane-type triterpenoids, flavonoids like quercetin and kaempferol derivatives (Onocha, 2010).

Alcoholic extracts of *A. hispida* were found to be active against *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus aureus* and *Salmonella typhii* (Onocha, 2010). Bokshi et al., (2012) reported the antibacterial activity of ethanolic leaf extract using disc diffusion method against various Gram positive and Gram negative bacteria. The extract showed activity against both Gram positive and Gram negative bacteria except *Shigella dysenteriae* and the inhibitory effect was observed to be concentration dependent (Bokshi et al., 2012).

Phenolic compounds from leaf extract were reported capable of antagonizing wood-rot fungi (Teoh et al., 2011). Semi-pure compounds from hexane fractions showed significant antioxidant activities by 2.2-diphenyl-1-picrylhydrazyl radical (DPPH) and hydrogen peroxide (H_2O_2) methods (Onocha, 2010).

Cytotoxicity test of hexane fractions were carried out by brine shrimp lethality test. Seven fractions were found to be toxic. The cytotoxic ability of the plant makes it useful in the treatment of diseases involving cell or tumour growth (Onocha, 2010).

Brine shrimp lethality bioassay was used to determine the cytotoxicity of crude ethanolic extract (Bokshi et al., 2012). The LC_{50} values of the ethanolic extract of leaves of *Acalypha hispida* and chloramphenicol were found to be 19.95 µg/ml and 7 µg/ml respectively. The results showed possible cytotoxic activity of the extract (Bokshi et al., 2012).

Leishmanicidal activity of methonolic leaf and stem extracts of *A. hispada* were investigated using *Leishmanial promastigotes* (Onocha et al., 2011b). The leaf methanolic extract of *A. hispida* was found to be leishmanicidal at an IC_{50} value of 71.75 µg/ml. $IC_{50} \leq 100$ µg/ml for extracts was considered significant. The methanolic leaf extract showed significant phytotoxicity with an inhibition of 70% at 1000 µg/ml (Onocha et al., 2011b).

3.18. *Acalypha indica* L.

A. indica commonly known as 'herbe chatte', 'Indian nettle cat's nettle' originates from India, Indochina and Ethiopia (Gurib-Fakim, 2007; 2011). It is an erect annual herb of 30-100 cm in height and occurs as a weed. It is also found in hottest parts of the globe (Takle et al., 2011). The plant is well-known for diuretic, anthelmintic, respiratory problems, rheumatoid arthritis, to cure scabies and other skin infections (Amarnath et al., 2013; Mahomoodally and Beeharry, 2013). The leaf juice acts as an emetic for children. Leaf decoction is used against earache and headache and is applied as a local application in syphilitic ulcers. The leaf is also used as an antiparasiticide and applied externally with common salt or quicklime or lime juice (Jayaprakasam and Ravi, 2012).

Crushed leaf poultice or mixed with Liane poc poc (*Cardiospermum halicacabum*, Sapindaceae) and applied on boils and skin infections (Gurib-Fakim and Gueho, 1996; Gurib-Fakim, 2007; 2011). A bath in the whole plant decoction is used against scabies, dermatitis and other skin infections. The root decoction is known to be laxative. The plant is used against bronchitis, scabies and help to eliminate stomach worms (Gurib-Fakim and Gueho, 1996; Gurib-Fakim, 2007; 2011). A recent survey on the use of herbal therapy among Mauritian people showed that *A. indica* is commonly utilized against skin conditions (Mahomoodally and Beeharry, 2013)

Preliminary analysis of aerial parts of *A. indica* defatted with petroleum ether showed the presence of steroids and triterpenoids (Jayaprakasam and Ravi, 2012). Ethanolic extract showed the presence of steroids, triterpenoids, glycosides, carbohydrates, alkaloids, flavonoids and tannins. Chloroform fraction contained glycosides and alkaloids, ethyl acetate fraction illustrated the presence of flavonoids and tannins (Takle et al., 2011). The active ingredients of the plant include cyanogenic glycosides acalyphin (0.3%), tannins and tri-O-methyl ellagic acid (Gurib-Fakim, 2007; 2011).

The plant has been reported to exhibit anti-venom, antioxidant activities and is also used to treat various cutaneous diseases. The whole plant of *A. indica* is known to possess anti-inflammatory property and analgesic effects. The leaves have strong anthelmintic property. The plant have also been reported to have bactericidal activity against important wound invading Gram positive and Gram negative pathogens and this property has indirectly been correlated to its wound healing ability (Moorthy et al., 2012). The plant is also reported to have laxative, anti-diabetic, expectorant, diuretic and post-coital antifertility effects (Takle et al., 2011).

The wound healing activity of ethanolic leaf extract was determined *in vivo* using male Wistar rats (Moorthy et al., 2012). This extract promoted and accelerated wound healing by enhancing the

contraction of wounds, significantly increasing the levels of ground substances such as hydroxylproline and glucosamine and causing a notable increase in the wound tensile strength. A remarkable increase in pro-inflammatory cytokine tumor necrosis factor (TNF-α) and ascorbic acid was observed with a decrease in lipid peroxidation. Growth factor TGF-β1 was enhanced in the presence of *A. indica*. Ethanolic leaf extract of *A. indica* was found to possess wound healing potential by up-regulating TNF-α and TGF-β1 genes (Moorthy et al., 2012).

The plant is known to posess antitumour effect *in vitro* (Amarnath et al., 2013). *In vitro* anticancer efficacy of a novel aqueous ethanolic extract of *Acalypha indica* (ETAI) loaded chitosan-casein (CS-CT) microparticles was evaluated in a cancer cell line model. Cytotoxicity was assessed on human prostate cancer cell line (PC3) by MTT assay. The results showed higher cytotoxicity after 72 h incubation. LDH assay showed a concentration dependent leakage of LDH from PC3 cells exposed to free ETAI and CS/CT/ETAI microparticles. The study showed that the use of significantly low concentration of *A. indica* loaded with CS/CT was a better approach compared to the use of free ETAI for cancer treatment in future (Amarnath et al., 2013).

The antioxidant activities of hexane, chloroform and methanol extracts of the *A. indica* were determined using DPPH and ABTS assays (Sanseera et al., 2012). The hexane, chloroform and methanol extracts showed antioxidant activities with an IC_{50} of 6.19±0.01, 5.70±0.05 and 7.70±0.02 mg/ml respectively. The IC_{50} value of the positive control, trolox was 0.08±0.001 mg/ml. The IC_{50} values of hexane, chloroform and methanol extract from ABTS assay were 6.13±0.01, 6.31±0.02 and 6.37±0.02 mg/ml respectively. Trolox was used as positive control and its IC_{50} value was 1.32±0.005 mg/ml (Sanseera et al., 2012).

The leaves of the plant in combination with *Azima tetracantha*, *Brassica juncea*, *Albizzia lebbeck* and *Aegle marmelos* were used in veterinary herbal composition for the treatment of ephemeral fever (Petharajanna, 2012).

3.19. *Acalypha integrifolia* Willd. subsp. integrifolia var. integrifolia

A. integrifolia is distributed in Mauritius, Madagascar and Réunion Island. It is commonly known as *bois queue de rat*, *bois de crève* and *bois de Charles* (Gurib-Fakim and Gueho, 1996; Schmelzer, 2007a). In Réunion Island and Mauritius, decoction of the leaves is consumed as astringent and purgative and is used to eliminate intestinal worms. A bath in the leaf decoction is taken to treat skin infections. The leaves, stems and roots contain saponins, tannins, sterols, terpenes and traces of

alkaloids (Gurib-Fakim and Gueho, 1996; Schmelzer, 2007a). There is no reported *in vitro* or *in vivo* evaluation of this species.

Table 6: Summary of phytochemicals and reported compounds from *Acalypha* species.

Species	Part used	Extract	Phytochemical class	Compounds	Reference
A. alnifolia Klein ex Willd.	L	NI	Tannins, steroids, flavonoids, cardiac glycolides		Noumedem et al., 2013
	L	AE	Carbohydrate, proteins, amino acids, phenolics, tannins, flavonoids, phytosterols and cardiac glycosides		Revathi *et* al., 2013
	L	Acetone		cyanoacetylurea; 4-(2-methylamino) ethyl pyridine; 1-alanine; N-(1-oxopoenyl)-, methyl ester; 3,5-dimethyl-1-dimethylphenylsilyloxybenzene; phenol; 4-4'-methylenebis(2,6-dimethyl), ethanone; 1-(4-methoxy-3-(4-methylphenoxy) phenyl; myo-inositol; 4-c-methyl; α-D-xylofuranoside; methyl-O-methyl	Revathi *et* al., 2013
A. alopecuroidea Jacq.	R	ME-THF (1:1))		9-(3,6-dimethyl-hepta-2,6-dienyl)-hypoxantine; 1,3,7,9-tetraethyl uric acid	Svačinova, 2011
A. australis L.	WP	ME		australisin ($C_{17}H_{16}O_{11}$); β-sitosterol; daucosterol	Dong et al., 1994
	AP	EE		1,3,8-trihydroxy-6-methyanthracene-9,10-dione; β-sitosterol; loliolide; 2,6-dimethoxy-1,4-benzoquinone; nicotinic acid; protocatechuic acid; daucosterol; 3,4,5-trihydroxybenzoic acid; rutin; butanedioic acid; 1-(2-hydroxy-4,6-dimethoxyphenyl)ethanone	Wang et al., 2008
A. brachystachya Hornem.	WP	EE		chrysophanol; physcion; 1,3,8-trihydroxy-6-methyanthracene-9,10-dione; 1,2-benzenedicarboxylic acid; 1,2-dibutyl ester; 1,2-benzenedicarboxylic acid; 1,2-bis (2-methylpropyl) ester; lignoceric acid salicylate; spinasterol; oleanolic acid; ursolic acid; 3β-hydroxyolean-	Qiong, 2010

				11-en-28; 13 β-olide; squalene	
A. communis Müll.Arg.	AP	NI		16 α-hydroxymollic; 15 α-hydroxymollic; 7 β,16 β-dihydroxy-1,23-dideoxyjessic acids	Gutierrez-Lugo et al., 2002
A. diversifolia Jacq.	AP	ME	Saponins and tannins, lactones		Mosquera et al., 2009
	AP	DCM	Tannins, flavonoids, sterols, saponins and alkaloids		Nino et al., 2012
	AP	HE	Sterols, saponins		Nino et al., 2012
	AP	ME	Tannins, flavonoids, alkaloids		Nino et al., 2012
A. filiformis Poir.	RB, SB, L	NI	Tannins and anthocyanins		Bosch, 2010
	L	NI	Alkaloids and saponins		Bosch, 2010
A. fruticosa Forssk.	AP	EE		1, 2-benzenedicarboxylic acid; diisooctyl ester; n-hexadecanoic acid; 9, 12-octadecadienoic acid	Gopalakrishnan et al., 2010
	AP	PE		α-D-glucopyranoside; eicosyltrichlorosilane	Gopalakrishnan et al., 2010
	L	CF	Terpenoids, tannins, coumarins, anthraquinones and saponins		Lingathurai et al., 2011
A. hispida Burm.f.	NI	NI		quercetin 3-O-rutinoside; kaempferol 3-O-rutinoside	Noumedem et al., 2013
	L	AE, ME	Phenolics, glycosides, flavonoids, steroids, phlobatanins, saponins		Iniaghe et al., 2009
A. indica L.	L	NI	Phenolics, tannins, alkaloids,		Noumedem et

			steroids, flavonoids, glycolides, saponins		al., 2013
				acalyphin; tri-O-methyl ellagic acid	Gurib-Fakim, 2007
				cyanogenic glycosides; triacetonamine, acalyphamide, quebrachitol	Gurib-Fakim and Gueho, 1996
A. manniana Müll.Arg.	L	ME	Alkaloids, phenols, flavonoids, anthraquinones, anthocyaninns, tannins and steroids		Noumedem et al., 2013
A. marginata (Poir.) Spreng.	L	AE, ME	Phenolics, flavonoids, saponins, hydroxylantraquinones		Iniaghe et al., 2009
A. monostachya Cav.	L	HE		octadecanal; palmitic acid methyl ester; linoleic acid methyl ester; linolenic acid methyl ester; phytol; eicos-9-ene-1; 20-diacetate; vitamin E	Canales et al., 2011
		ME	Phenolic: benzoic acid, flavone, and flavanone derivatives		Canales et al., 2011
	NI	NI	Phenolics, fatty acids methyl ester		Noumedem et al., 2013
A. ornata Hochst. ex A.Rich.	L	EO		isopulegyl acetate; valenche; viridiflorene; α-muurolene / 7-hexadecyne; 2-hexyne; thymo hydroquinine; γ-elemene; E-2-methyl-4-undecene; ledol; cis-3-hexenyl benzoate; 2-methyl-1-octadecene; E,Z-3, 13-octadecadien-1-ol; acetate; cis-2-methyl-7-octadecene; Z-2-methyl-4-undecene; apiole; oplopanone; cis-nerolidol; γ-eudesmol	Onocha et al., 2011c
A. phleoides	AP	M-TCM		β-sitosterol; aliphatic alcohols: $C_{22}H_{46}O$; $C_{24}H_{50}O$;	Astudillo et al.,

Cav.		(1:1)			2004
	AP	EO		$C_{25}H_{52}O$; $C_{26}H_{54}O$; $C_{27}H_{56}O$; $C_{28}H_{58}O$; $C_{29}H_{60}O$; $C_{30}H_{62}O$ monoterpenes: 2-isopropyl-5-methylphenol; 1,7,7-trimethylbicyclo[2.2.1]heptane-2-one; 4-methyl-1-(1-methyethyl)-1,4-cyclohexadiene	Astudillo et al., 2004
A. racemosa Wall. ex Baill.	L	AE	Phenolics, flavonoids, steroids, phlobatanins, saponins		Iniaghe et al., 2009
	L	ME, AE	Phenolics, flavonoids		Iniaghe et al., 2008
A. segetalis Müll.Arg.	WP	EO		α-pinene; neophytadiene; neophytadiene	Aboaba et al., 2010
	NI	EO		α-pinene; 1, 8-cineole; E-phytol; δ-3-carene	Ogunwande et al., 2008
A. siamensis Oliv. ex Gage.	NI	NI		Tetraterpene; acalyphaser A	Kambara et al., 2006
A. torta Muell.	L		Alkaloids, flavonoids, saponins, tannins, glycosides		Ezekwesili and Nwodo, 2013
	NI	NI	Alkaloids, flavonoids, saponins, tannins, resins and carbohydrates		Onocha et al., 2011
A. wilkesiana Müll.Arg.	L			methyl 3,4,5-trihydroxybenzoate	Tauseef et al., 2013
	NI	NI		3,4,5-trihydroxybenzoic acid; corilagin; geraniin	Noumedem et al., 2013
	WP	NI	Tannins, coumarins, terpenes, flavonoids, glycosidic flavonoids		Gurib-Fakim and Gueho, 1996

L= Leaves, WP= Whole plant, AP= Aerial part, R= Roots, RB= Root bark, SB= Stem bark, EO= Essential oil, AE= Aqueous extract, ME= Methanolic extract, HE= Hexane extract, EE= Ethanolic extract, DCM= Dichloromethane, MeOH-$CHCl_3$= M-TCM, PE= Petroleum ether, CF= Chloroform fraction, NI= Not indicated

3.20. *Acalypha lanceolata* Willd.

This plant is distributed from India eastward to the Philippines, throughout Malaysia and Polynesia (Siregar, 2001a). In Moluccas, the leaves are applied as an antiseptic on boils and swellings. The whole plant is used against headache in Indo-China. In Fiji, it is used as a vermicide and carminative and is also applied to sores (Siregar, 2001a; IMPGC, 2003-10). Perumal Samy et al., (2013) reported the antimicrobial activities of methanolic leaf extract against multidrug resistant human pathogens. The methanolic leaf extract of *Acalypha lanceolata* showed the presence of alkaloids (Perumal Samy et al., 2013).

3.21. *Acalypha lyallii* Baker

In Madagascar and Comoros, a leaf decoction of the plant is used to massage parts of the body to treat rheumatism (Gurib-Fakim and Brendler, 2004; Schmelzer, 2007a).

3.22. *Acalypha macrostachya* Jacq.

Mosquera et al., (2009) found that the methanol extract of the aerial part of the plant was inactive against DPPH free radical and the extract showed the absence of various phytochemicals. The ethanol and water extracts of the plant showed antimicrobial activity against *Cercospora purpurea* (Ogbo and Oyibo, 2008).

3.23. *Acalypha mandonii* Müll.Arg.

In Peru, the whole plant, fresh or dried is used against liver inflammation and to clean blood of toxins (Bussmann et al., 2010; 2011). The methanol extract showed antibacterial activity against *Staphylococcus aureus* (Bussmann et al., 2011).

3.24. *Acalypha manniana* Müll.Arg.

In the western region of Cameroon, leaf decoction of the plant is used to treat mycosis and skin diseases (Noumedem et al., 2013). A leafy stem decoction is taken against diarrhea in some African countries namely Ivory Coast, Ghana, Uganga, Rwanda, Burundi and Cameroon. The plant extracts and fractions showed antibacterial, antidermatophytes and antioxidant activities. The leaf extract showed the presence of alkaloids, phenols, flavonoids, anthraquinones, anthocyanins, tannins and steroids (Noumedem et al., 2013).

Table 7: Bioactive compounds identified from *Acalypha* species

Acalypha species	Type of study	Compounds	Reference
A. alopecuroidea Jacq.	Anticancer	9-(3,6-dimethyl-hepta-2,6-dienyl)-hypoxantine	Svačinova, 2011
A. communis Müll.Arg.	Antimicrobial	16 α-hydroxymollic; 15 α-hydroxymollic; 7 β,16 β-dihydroxy-1,23-dideoxyjessic acids	Gutierrez-Lugo et al., 2002; Das et al., 2012
A. fructicosa Forssk.	Antioxidant	*n*-hexadecanoic acid, 9, 12-octadecadienoic acid	Gopalakrishnan et al., 2010
A. hispida Burm.f.	Antimicrobial	gallic acid; corilagen; geraniin	Das et al., 2012
A. indica L.	Antimicrobial Hemostatic and antibacterial	silver nanoparticles acalyphine	Das et al., 2012 Gurib-Fakim, 2007
A. phleoides Cav.	Antispasmodic Bronchodilator	monoterpenes from EO: thymol; camphor; γ-terpinene EO: camphor; thymol	Astudillo et al., 2004 Astudillo et al., 2004
A. siamensis Oliv. ex Gage.	Cytotoxicity	tetraterpene; acalyphaser A	Kambara et al., 2006
A. wilkesiana Müll.Arg.	Antimicrobial	gallic acid; corilagen; geraniin	Das et al., 2012; Noumedem et al., 2013

EO= Essential oil

3.25. *Acalypha marginata* (Poir.) Spreng.

This species has been listed as the synonym of *Acalypha integrifolia* subsp. *marginata* (Poir.) Coode in the Plant List (www.theplantlist.org). Diab et al., (2012) has reported the antimicrobial activities of chloroform leaf extracts of the plant. The minimum lethal concentration (MLC) against *Listeria monocytogenes* and *Escherichia coli* were 120 µg/ml and 30 µg/ml against *S. enteritidis*. The antiradical activities of chloroform and methanol extracts were 29 and 89 percent

respectively (Moussa et *al.*, 2011). The aqueous and methanolic extracts of leaf revealed the presence of phenolics, flavonoids, saponins, and hydroxylantraquinones (Iniaghe et al., 2009).

3.26. *Acalypha monostachya* Cav.

This species is a perennial herb found from the south-western United States to Mexico (Canales et al., 2011). It is utilized as medicinal plants by the inhabitants of San Rafael and Zapotitlan Salinas, Puebla, Mexico against skin eruptions, wound and diarrhea methanol extract showed antimicrobial and antioxidant activities as well as toxicity against *A. salina* (Canales et al., 2011).

3.27. *Acalypha ornata* Hochst. ex A.Rich.

A. ornata occurs throughout tropical Africa (Aboaba et al., 2012). The leaves and roots are utilized for their medicinal properties. The cooked leaf is used to relieve post-partum pains and the root is used to heal circumcision wounds in Tanganyika (Aboaba et al., 2012). Boiled water extract of the plant is used to treat bacterial and fungal skin infections in children by the natives of Lagos suburb (Emeka et al., 2012). A leaf decoction is used to wash the skin infected with scabies on children, the root for leprosy, and the plant (part unspecified) in the treatment of infections of the umbilicus of new-born babies. In Ubangi, decoction of the leaf is used against piles as hip-bath and a root decoction is also drunk (Aboaba et al., 2012). In Uganda, the leaves of the plant are ingested by chimpanzees against post-partum pain (Krief et al., 2005; Pebsworth et al., 2006). Emeka et al., (2012) reported the antimicrobial activity of water and methanol leaf extracts of the plant. The extracts were found to be active against bacterial clinical isolate strains namely *Klebsiella pneumonia*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*. The leaf extracts reduced the growth of *Trichophyton rubrum* and *Trichophyton mentagrophytes* (Emeka et al., 2012). The leaf essential oil showed toxicity (Onocha et al., 2011c) and larvicidal activities against *An. gambiae* and *Artemia salina* (Aboaba et al., 2012). The EO (10 µg/ml) showed weak free radical scavenging activity (20.50%) as compared to the

control ascorbic acid (90.90%) at similar concentration. GC-MS analysis of the EO identified 89 components (Table 6) (Onocha et al., 2011c).

3.28. *Acalypha phleoides* Cav.

This plant is used in the Mexican traditional medicine against diarrhea, colic, peptic ulcers, wounds and snake bite (Astudillo et al., 2004). It has been reported to possess antiprotozoal activity against *Entamoeba histolytica* and *Giardia lamblia*. *In vivo* and *in vitro* assays showed that extract from the aerial part of the plant as well as the essential oil (EO) exhibited antispasmodic activity. Antispasmodic compounds, thymol, camphor and γ-terpinene were identified from EO by GC-MS. These components also showed tracheal relaxant properties in high concentration with the exception of γ-terpinene (Astudillo et al., 2004).

3.29. *Acalypha platyphylla* Müll.Arg.

A. platyphylla has been reported to possess antioxidant, antimicrobial and cytotoxic activities (Madlener et al., 2009). Mosquera et al., (2007) reported the antioxidant activity of *n*-hexane, dichloromethane and methanol extracts of the plant and their IC_{50} values (mg/l) were 269.45, 111.99 and 189.17 respectively.

3.30. *Acalypha psilostachya* Hochst. ex A.Rich.

Leaf juice of *A. psilostachya* and other 10 species of different genera is used as eye drops against inflammation of the conjunctiva (Berts and Lehmann, 1989).

3.31. *Acalypha puriens* Nees & Mart.

This plant is thought to produce itching (Botanical dermatology database, 1994-2014).

3.32. *Acalypha racemosa* Wall. ex Baill.

This species is a synonym for *Acalypha paniculata* Miq and is reported as an invalid name (The Plant List, 2013). Iniaghe (2008 and 2009) described the traditional uses, phytochemistry and biological activities of the plant. Decoction of the leaves of *A. racemosa* is reported to cure neonatal jaundice in Ilorin metropolis of Kwara State, Nigeria (Iniaghe, 2008; 2009). Leaf extracts of the plant showed antimicrobial properties. Aqueous and methanolic leaf extracts

showed the presence of phenolic, flavonoids, steroids, phlobatanins, saponins and hydroxylantraquinones (Iniaghe, 2008; 2009).

3.33. *Acalypha radula* Baill.

In Madagascar, a decoction of the aerial part of *A. radula* and *A. andringitrensis* is taken or inhaled to treat fever and syphilis while the crushed leaves are applied topically against scabies (Schmelzer, 2007a).

3.34. *Acalypha spachiana* Baill.

The leafy stem of the plant is used in decoction to treat venereal diseases in Madagascar (Schmelzer, 2007a).

3.35. *Acalypha segetalis* Müll.Arg.

This species is widespread in tropical Africa. It is used as vegetables (Burkill, 1994). Aboaba et al., (2010) reported the presence of 19 volatile components from the essential oil of the whole plant and the main compounds were α-pinene (8.5%), neophytadiene, isomer II (14.7%), and neophytadiene, isomer III (33.6%). The yield of α-pinene obtained by Ogunwande et al., (2008) was higher, 29.8% and other constituents were also identified such as 1, 8-cineole (16.2%), phytol (11.8%) and δ-3-carene (9.8%). Toxicity and larvicidal assays revealed that the plant had LC_{50} values of 14.0 µg/ml and 45.4 µg/ml respectively (Aboaba et al., 2010).

3.36. *Acalypha siamensis* Oliv. ex Gage.

This species is native to Thailand, Vietnam, Peninsular Malaysia, Sumatra and Sulawesi (Teo et al., 2011). *A. siamensis* was active against P388 murine leukemia cells and a novel tetraterpene, acalyphaser A, was isolated (Kambara et al., 2006). Ethyl acetate and methanol leaf fractions showed significant antibacterial activity compared to hexane and dichloromethane fractions while no activity was observed against tested moulds (Wiart et al., 2004).

3.37. *Acalypha torta* Muell.

The plant was not listed in any of the databases, but was only mentioned by Irobi and Banso (1994) as *A. torta* Muell.Arg. According to Ezekwesili and Nwodo (2013), *A. torta* is widely distributed all over the world particularly in the tropics and sub-tropical Africa, Asia and America. In Nigeria, this species is used in the treatment of malaria, stomach upset, dermatitis, bacterial and fungal infections (Ezekwesili and Nwodo, 2013) as well as hypertension (Ezekwesili et al., 2012). It is used against superficial skin infection (Ekpo and Etim, 2009; Onocha et al., 2011b). The plant is also used for the treatment of neonatal jaundice (Onocha et al., 2011b; Tauseef et al., 2013). Methyl gallate was isolated from methanolic extract of the plant and it showed better antioxidant activity (EC_{50}, 2.3 µg/ml) compared to Vitamin C (EC_{50}, 9.4 µg/ml) (Tauseef et al., 2013). Ezekwesili and Nwodo (2013) reported the antidiarrhoeal, antithrombotic and immunosuppressive activities of ethanolic leaf extract of the plant. The results showed that the extract inhibited spontaneous contraction of rabbit intestinal smooth muscle, human blood platelet aggregation and blood clotting. It was reported to enhance red blood cell proliferation but suppressed white blood cell formation (Ezekwesili and Nwodo, 2013). Brine shrimp lethality test showed that extracts from the plant were toxic (Onocha et al., 2011d). Ezekwesili et al., (2012) described the anti-hypertensive activity of ethanolic leaf extract using anaesthetized cats, isolated rabbit aortic strips and rat hind-quarters preparation. The results showed that the extract had a relaxant effect on vascular smooth muscle (Ezekwesili et al., 2012) and thus confirmed the claimed folk uses of the plant against hypertension.

3.38. *Acalypha villicaulis* Hochst. ex A.Rich.

A maceration of the leaves of the *A. villicaulis* in combination with that of *Rauvolfia vomitoria* Afzel., *Caesalpinia decapetala* (Roth) Alston. and *Tetradenia riparia* (Hochst.) Codd. is used against fever (Balagizi et al., 2005).

3.39. *Acalypha virginica* L.

This species is reported as being diuretic and irritant (Pammel, 1911; Botanical dermatology database, 1994-2014).

3.40. *Acalypha wilkesiana* Müll.Arg.

This species is native to Fiji and is spread to most parts of the world, especially in the tropics (Gurib-Fakim and Gueho, 1996) of Africa, America and Asia (Iniaghe et al., 2013). Many cultivars are available with different leaf forms and colours. Aqueous leaf extract of the plant is used to treat neonatal jaundice in west of Nigeria on a short-term basis (Iniaghe et al., 2013). The expressed juice of boiled decoction of the leaves of *A. wilkesiana* cv. *godseffiana* is used against gastrointestinal disorders, diabetes mellitus and fungal skin infections such as *Pityriasis versicolor*, *Impetigo contagiosa*, *Candida intetrigo*, *Tinea versicolor*, *Tinea corporis* and *Tinea pedis*. In traditional medicine, the leaves of this diuretic plant are eaten as vegetables in the management of hypertension (Ikewuchi, and Anyadiegwu, 2008). The leaf-poultice is used to treat headache, swellings, colds and malaria. The extracts from the seeds have immuno-modulating properties that work against some tumors (Soladoye et al., 2008). Traditional healers in south-west Nigeria use the seeds in compounding a complex plant mixture in the treatment of breast tumours and inflammation (Ikewuchi et al., 2011; 2013).

In Mauritius, an infusion of tender leaves is taken three times a day against diabetes and dysentery. Leaf decoction of *Acalypha red* and that of *Psidium cattleianum* is used to treat dysentery. A decoction of the young leaves is taken orally 2 times per day against asthma. In Rodrigues, crushed leaf poultice is applied on stomach in acute pain (Gurib-Fakim and Gueho, 1996). *A. wilkesiana* is used against postpartum pain among Mauritian women (Suroowan and Mahomoodally, 2013).

Gas chromatographic analysis of aqueous leaf extract showed the presence of 29 known flavonoids comprising mainly of 29.77% apigenin, 11.12% naringenin, 10.62% kaempferol, 9.05% (-)-epicatechin and 14.97% quercetin (Ikewuchi et al., 2011). The sterol extract contained 100% sitosterol and tannin extract consisted of 100% tannic acid. All of these compounds have been reported to posess antineoplasmic and anticarcinogenic properties (Ikewuchi et al., 2011). Phytochemical analysis of ethanolic leaf extract indicated the presence of high level of tannins and glycoside, a moderate presence of saponin, flavonoids, phylobatanins and glycosides and slight presence of alkaloids and cardiac glycosides (Awe et al., 2013). Previous studies reported the presence of sesquiterpene, monoterpenes, polyphenols, saponins, tannins, anthraquinone and glycoside in the leaves of *A. wilkesiana* (Awe et al., 2013). Proximate analysis of the leaves showed the presence of ash, moisture, total lipid, fiber, protein and energy. Elemental analysis of

the leaves revealed the presence of sodium (Na^+), potassium (K^+), chloride (Cl^-) and calcium (Ca^{2+}). The leaf ws repored to contain high amount of K^+ and low level of Na^+ which can be a source of useful diuretic drugs since the effects of sodium can be countered by potassium (Kingsley et al., 2013).

The antimicrobial potential of methanolic leaf extract and its four fractions were investigated on human pathogenic bacteria namely strains of *Staphylococcus aureus*, *Streptococcus pyogenes*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*, *Proteus vulgaris* and *Escherichia coli* and fungi: *Aspergillus niger*, *Aspergillus flavus*, *Aspergillus carbonarius*, *Trichophyton mentagrophytes* and *Candida albicans* (Haruna et al., 2013). The results showed broad spectrum activity against both Gram-positive and Gram-negative bacteria. Ethyl acetate fraction inhibited the growth of more bacteria and fungi compared to other fractions. Aqueous extract was more active on bacteria isolates. Methanolic extract and its fractions displayed better antibacterial activity than antifungal activity. Since the plant was active against both clinical and laboratory isolates, it can be a source of very potent antibiotic substances that can be utilized against drug resistant microorganisms (Haruna et al., 2013). Ethanolic leaf extract and ointments formulation with the extracts were evaluated for their antimicrobial activity using *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Candida albicans*, *Aspergillus flavus* and *Penicillium notatum*. Herbal ointments formulation included ethanolic extract of *A. wilkesiana* (10% w/w) into emulsifying ointment and simple ointment bases and a commercial brand (Funbact A® cream) were also tested. The formulation containing the extract in emulsifying ointment showed better antibacterial activity than simple ointment and was compared with the commercial cream. The study revealed that ethanolic extract of *A. wilkesiana* has antibacterial and anticandidal activity as well as high potential as antimicrobial agent when formulated as ointment for topical use (Chukwuemeka et al., 2013). In a similar clinical trial, Oyelami et al., (2003) reported the clinical evaluation of *A. wilkesiana* ointment in the treatment of superficial fungal skin diseases. Thirty-two Nigerian patients were recruited based on clinical and mycological evidence of superficial mycoses. Only 13 patients completed the trial and 73.3% of the patients were cured. The ointment was effective in the treatment of *Tinea pedis*, *Pityriasis versicolor* and *Candida intetrigo* where the cure rate was 100% in each condition (Oyelami et al., 2003).

Lim et al., (2013) assessed the ethyl acetate extract (EA) of *A. wilkesiana* in combination with α-tocopherol for cytotoxicity activity against U87MG (grade IV human brain glioblastoma), A549 (human lung carcinoma) cell lines and MRC5 (normal human lung fibroblast). Both α-tocopherol and EA showed potent antiproliferative effects against U87MG and A549. However, no significant growth inhibitory effects were observed on non-cancerous MRC5 cells (Lim et al., 2013).

In vivo diuretic activity of aqueous leaf concoction was studied on 3 months old New Zealand white rabbits. A significant decrease in plasma sodium concentrations and significant increase in potassium concentrations was observed. Thus, the plant was suggested for the management of abnormal sodium and potassium metabolisms that accompany hypertension (Ikewuchi *et al.*, 2008). Ikewuchi (2013) determined the effects of an aqueous extract of *A. wilkesiana* on plasma chemistry and haematological indices of sub-chronic salt-loaded rats. The extract had no negative effects on markers of liver and kidney functions, produced hemoconcentration, significantly higher plasma sodium and chloride levels in test animals compared to test controls. The data supports the traditional use of the plant in managing hypertension (Ikewuchi, 2013).

The effect of aqueous leaf extract of the plant was studied on the hematology, plasma biochemistry and ocular indices of oxidative stress using alloxan induced diabetic rats (Ikewuchi et al., 2011). In comparison to test control, the treatment lowered plasma glucose, triglyceride, conjugated bilirubin levels and other biochemical parameters but increased plasma calcium contents, total white cell and platelet counts, mean cell volume and ocular ascorbic acid content, plasma high density lipoprotein cholesterol level, red cell and neutrophil counts. The extract was found to be hypoglycemic, had positive effects on the hemopoietic system and function of the liver and kidney of the diabetic rats. It also improved the lipid profile, had no harmful effect on red cell morphology and protected against oxidative stress in ocular tissues (Ikewuchi et al., 2011).

4. Conclusion and future perspectives

This review represents approximately 32.3% of the species from *Acalypha* genus and summarizes their ethnomedicinal uses as well as biological activities. *Acalypha* species are widely distributed in China, Africa, India, Mascarenes Islands, north and southern America

where many species are utilized for their medicinal purposes as well as vegetables for consumption. Some species are also used in ethnoveterinary and zoopharmacognosy. Species from this genus contain key bioactive phytochemicals such as tannins, flavonoids, phenolics, saponins, alkaloids, terpenoids, coumarins, anthocyanins, and anthraquinones which might contribute directly or indirectly to the biological properties highlighted in the present review. Furthermore, 16 compounds were found to be bioactive in studies namely anticancer, antimicrobial, antioxidant, hemostatic, antispasmodic, bronchodilator, and cytotoxic. These compounds can be considered as promising candidates for the development of novel and effective pharmaceutical agents. Studies have shown that the chances for a plant to be bioactive are significantly higher when plant selection is done on the basis of ethnomedicinal approach as compared to random plant selection. It is anticipated that the present review can be used to validate ethnomedicinal practices and bioactivities of some *Acalypha* species. Currently, there is no reported activity on *A. integrifolia* which is indigenous to the Mascarene Islands. Thus, future studies could be geared towards *Acalypha* species found in the Mascarenes islands. Although, *A. indica* L. has gained a widest attention within the genus, there are no clinical studies on the plant. Therefore, the clinical evaluation of this species should be carried out in future studies for the safety approval of therapeutic applications. Further *in vitro* and *in vivo* genotoxic tests of other species of this genus are also important to confirm the ethnomedicinal claims.

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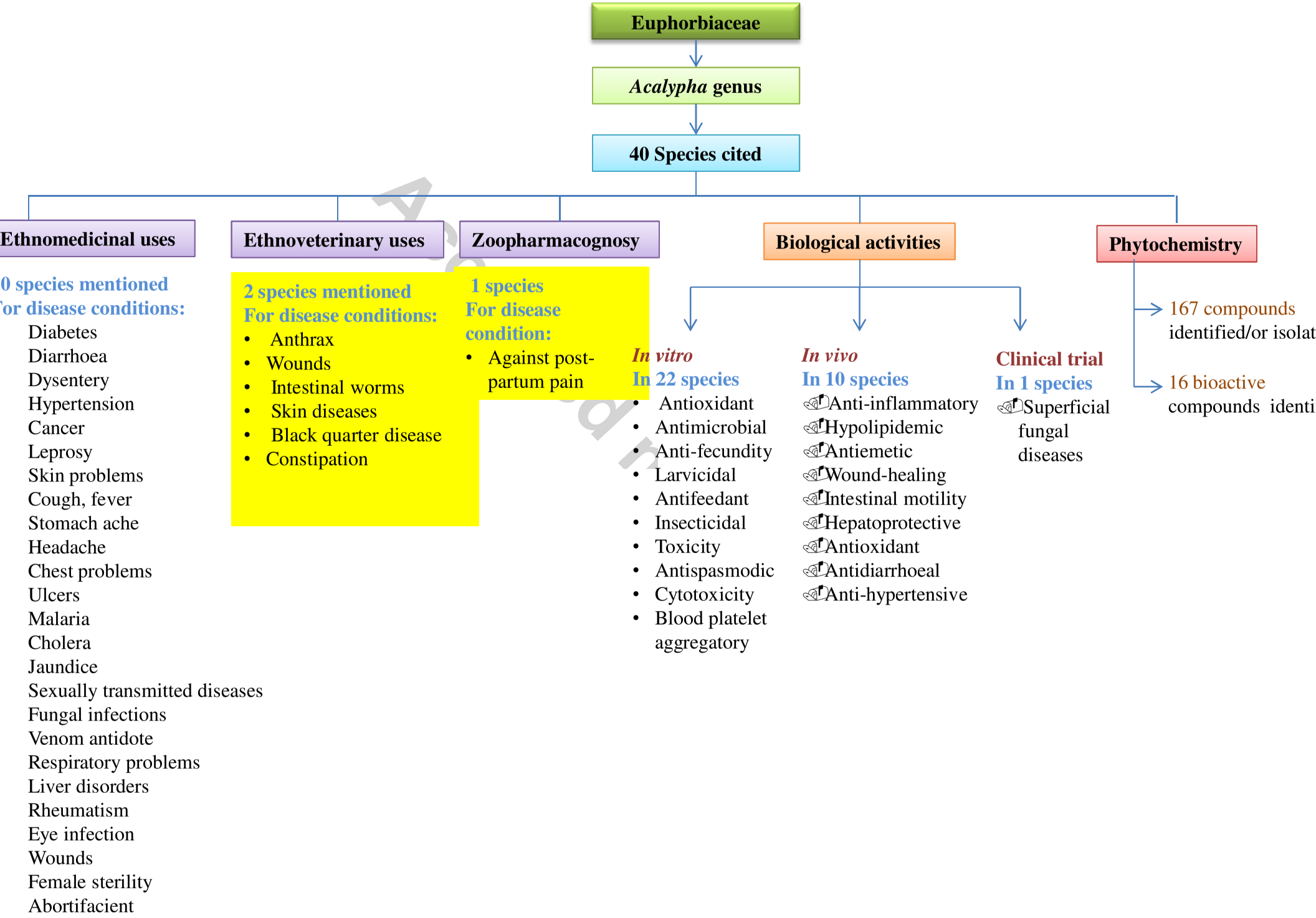
Euphorbiaceae
Acalypha genus
40 Species cited
Ethnomedicinal uses
0 species mentioned
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Diabetes
Diarrhoea
Dysentery
Hypertension
Cancer
Leprosy
Skin problems
Cough, fever
Stomach ache
Headache
Chest problems
Ulcers
Malaria
Cholera
Jaundice
Sexually transmitted diseases
Fungal infections
Venom antidote
Respiratory problems
Liver disorders
Rheumatism
Eye infection
Wounds
Female sterility
Abortifacient
Ethnoveterinary uses
2 species mentioned
For disease conditions:
Anthrax
Wounds
Intestinal worms
Skin diseases
Black quarter disease
Constipation
Zoopharmacognosy
1 species
For disease condition:
Against post-partum pain
Biological activities
In vitro
In 22 species
Antioxidant
Antimicrobial
Anti-fecundity
Larvicidal
Antifeedant
Insecticidal
Toxicity
Antispasmodic
Cytotoxicity
Blood platelet aggregatory
In vivo
In 10 species
Anti-inflammatory
Hypolipidemic
Antiemetic
Wound-healing
Intestinal motility
Hepatoprotective
Antioxidant
Antidiarrhoeal
Anti-hypertensive
Clinical trial
In 1 species
Superficial fungal diseases
Phytochemistry
167 compounds identified/or isolat
16 bioactive compounds identi