



**A REVIEW ON THE PHYTOCONSTITUENTS AND PHARMACOLOGICAL ACTIONS  
IN THE MEDICINAL PLANTS OF BEDABUNA FOREST, JIMMA ZONE, SOUTH WEST  
ETHIOPIA REPORTED EFFECT ON EXPERIMENTAL MODELS**

**Kumar Ganesan<sup>1\*</sup>, Suresh Kumar P. Nair<sup>1</sup>, Melese Sinaga<sup>1</sup>, Sharmila Banu Gani<sup>2\*</sup>**

<sup>1</sup>Department of Biomedical Sciences, School of Public Health and Medical Sciences, Jimma University, Jimma 378, Ethiopia

<sup>2</sup>Department of Zoology, NKR Government Arts College for Women, Namakkal-637001, Tamilnadu, India

**\*Author for Correspondence: Dr. Kumar Ganesan**

Department of Biomedical Sciences, School of Public Health and Medical Sciences, Jimma University, Jimma 378, Ethiopia

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**ABSTRACT**

Ethiopia is sixth largest biodiversity centre in the world having numerous ethnic cultures, climate and topographies. The present paper reviews on medicinal properties along with atypical Phytoconstituents and pharmacological actions of various plants in bedabuna forest, Zimma zone, Southwest Ethiopia, which has been reported effect on experimental models. This study is very authentic and helpful to find richest bioresources like identification of medicinal plants, documentation, protection and sustainable usages. This study will helpful to not only a native people of Jimma, southwest Ethiopia but also the other part of the Ethiopia to explore the indigenous medicinal plants used in the treatment of various ailments for human and livestock. In the present study totally 49 species of traditional medicinal plants belonging to 31 families were come across by regular ground visits and arbitrarily interviewed with native participants. The data includes common name, family, scientific name, Phytoconstituents and pharmacological actions and these plants were collected and identified with the help of herablist or rural dwellers, taxonomy books, internet and by their vernacular names and later validate with help of taxonomist by preparing herbarium. Ethnobotanical data were collected using field observation and the plant parts were used either separately or in combination with other plants. The information of traditional herbal medicine is conceded from generation to generation. The present study facilitates the plentiful knowledge of conventional medicinal plants that are being used for the various disease treatments by the native people of Jimma, Southwest Ethiopia.

**KEYWORDS:** Ethnobotany survey, conventional knowledge transfer, Jimma populations, Southwest Ethiopia.

**INTRODUCTION**

Ethiopia is gifted with a richest biodiversity centre containing about 7000 species of higher plants, with about 12% endemic plants<sup>[1,2]</sup>. Of these, Approximately 63% of the dense forest which is located in southwest region of Ethiopia<sup>[3]</sup> where predominant medicinal plants are confined<sup>[4]</sup> and have been used as a source of traditional medicine to treat various diseases<sup>[5,6]</sup>. However, due to inhabitants, fast urbanization, habitual drought, and deforestation, the majority of the indigenous medicinal plants are either shattered or on the threshold of disappearance. Documentation of this traditional knowledge of curative system still remains at lowest level. Some investigators in Ethiopia have pointed out the rate of eradication of both traditional knowledge and the plants signals for the need of intervention. Hence the aim of the present review is to give all-inclusive information on the traditional uses, Phytoconstituents,

pharmacological actions of various genera and species of medicinal plants to explore their therapeutic potential and future research opportunities. All the relevant information of Phytoconstituents, pharmacological actions of medicinal plants has been reported effect on various experimental models. It was collected through MEDLINE/PUBMED.

**MATERIALS AND METHODS**

**Study area:** The chosen area, Bedabuna Forest, Jimma, South West Ethiopia, is situated 12 km from Zimma Central town. It is located in the Latitude: 7°39'50.54" and Longitude: 36°52'38.38". Jimma Forest is next to Kotja and is located in Oromiya Region, Ethiopia. The altitude of the study area is about 1560 m above sea level.

**Methodology:** The survey conducted from September 2015 to November 2015. In the present study we focused

mainly on medicinal plant species reported by the native people of Zimma zone. The data includes common name, family, scientific name, Phytoconstituents and pharmacological actions and these plants were collected and identified with the help of herablist or rural dwellers, taxonomy books, internet and by their vernacular names and later validate with help of taxonomist by preparing herbarium. All the applicable data of Phytoconstituents and pharmacological potential of traditional medicinal plants have been experimentally proved by various rodents study. It was collected through MEDLINE/PUBMED.

### RESULTS AND DISCUSSION

Traditional medicinal plants with Phytoconstituents and pharmacological actions used by Jimma populations and reported effect on experimental models, described in Table-1. Totally 49 species of plants belonging to 31 families were identified to be effectively used for the treatment of various diseases.

Conventional medicinal system has long been recognized as one of the oldest forms of antidote for many diseases [7]. Still developing countries follow on indigenous therapeutic practices and herbs for their day to life

healthcare needs, though the improvement in recent medicine [8]. It is plentiful undocumented conventional knowledge of herbal remedies used by almost all community to treat various dreaded diseases. Conventional therapeutic practices worldwide are designed for either healing or prophylactic use for veterinary and human diseases. Numerous researches carried out in developed and developing countries show that medicinal herbs are normally used as antidote for human and animal diseases [9]. Allopathy medicine has lot of side effect and hence, one of the choices for the key to rectify the health problem, by means of employing traditional medicine. However, the documentation of this native information of curative system still remains at lowest level [10]. The findings of this study provided that, most of the traditional medicinal plants used by the population of Zimma zone contain enormous amount of medical substances which has been accumulated in the form of fresh secondary metabolites or Phytoconstituents. All the medicinal plants experimentally proved by various laboratory conditions in rodent models. Moreover, the results of this study indicated that, there were many individual medicinal plants which consist of two or more Phytoconstituents used for treatment of the same or different diseases.

<b>Table-1: Traditional medicinal plants with Phytoconstituents and pharmacological actions used by Jimma populations and reported effect on experimental models</b>				
<b>Family</b>	<b>Common name</b>	<b>Plant name</b>	<b>Phytoconstituents</b>	<b>Pharmacological Actions</b>
Leguminosae	Rosary Pea, Indian Licorice, Precatory Bean	<i>Abrus precatorius</i> L.	Abrectorin, abricin, abridin, abrin A–D, (+)-abrine, abruslactone A, abrusgenic acid, abrusogenin, abrusoside A–D, precatorine, abruquinones, abraline, abrusic acid, abruquinone G.	Antibacterial <sup>[11]</sup> , Anthelmintic <sup>[12]</sup> , Antiviral, Antiplasmodial, Antitubercular <sup>[13]</sup> , Anti-inflammatory <sup>[14]</sup> , Anticancer/ Antitumour <sup>[15]</sup> , <sup>[16]</sup> , Antioxidant, Antiplatelet <sup>[17]</sup> , Antiprotozoal <sup>[18]</sup> , Immunomodulatory <sup>[16]</sup> , and Molluscicidal <sup>[19]</sup> .
Polypodiaceae	Black Maidenhair Fern, Southern Maidenhair Fern, Venus Hair Fern	<i>Adiantum capillus-veneris</i> L.	Adiantoxide, adiantone, isoadiantone, isoadiantol, hydroxyadiantone, capesterol	Antibacterial <sup>[20]</sup>
Aloaceae	Aloe, Lidah Buaya	<i>Aloe vera</i> Mill.	Aloin (barbaloin), arabinose, aloe-emodin, aloetic acid, emodin, aloeresin A–C, aloesone, aloeride	Angiogenic <sup>[21]</sup> , Antifungal <sup>[22]</sup> , Antidiabetic <sup>[23]</sup> , Anti-inflammatory <sup>[24]</sup> , Anticancer <sup>[25]</sup> , Antimicrobial <sup>[26]</sup> , Antioxidant <sup>[27]</sup> , Antiproliferative <sup>[28]</sup> , Chemopreventive <sup>[29]</sup> , Gastric mucosal protection <sup>[30]</sup> , Hepatoprotective <sup>[31]</sup> , Neuroprotective <sup>[32]</sup> , Hypolipidaemic <sup>[33]</sup> , Immunomodulatory <sup>[34]</sup> , Immunostimulatory <sup>[35]</sup> , Antimutagenic <sup>[36]</sup> , Alloantigenic <sup>[37]</sup> , Antileishmanial <sup>[38]</sup> , Prevention of kidney stones <sup>[39]</sup> , Radioprotective <sup>[40]</sup> , and Wound healing <sup>[41]</sup> .
Acanthaceae	Hempedu Bumi, Sambiloto, Chuan Xin Lian <i>Andrographis</i>	<i>Andrographis paniculata</i> (Burm.f.) Nees	Andrographolide, andropanolide, andrographic acid and andrographidine A, andrographoside, andropaniculosin A and andropaniculoside A	Antiapoptotic <sup>[42]</sup> , Antibacterial <sup>[43]</sup> , Antifungal <sup>[44]</sup> , Anticancer <sup>[45]</sup> , Antidiabetic/ Hypoglycaemic <sup>[46, 47]</sup> , Antifertility <sup>[48]</sup> , Anti-inflammatory <sup>[49]</sup> , Antioxidant <sup>[50]</sup> , Antiplatelet <sup>[51]</sup> , Antiprotozoal <sup>[52]</sup> , Antiviral <sup>[53]</sup> , Cardioprotective <sup>[54]</sup> , Chemopreventive <sup>[55]</sup> , Hepatoprotective <sup>[56]</sup> , Hypotensive <sup>[57]</sup> , Immunomodulatory <sup>[58]</sup> , Psychopharmacological activities <sup>[59]</sup> , Vasorelaxant <sup>[60]</sup> , and Cytotoxic <sup>[61]</sup>
Aspleniaceae	Bird's Nest Fern	<i>Asplenium nidus</i> L.	Kaempferol-3- <i>O</i> -gentiobioside-7,4'-bisglucoside, kaempferol-3- <i>O</i> -diglucoside, kaempferol-3,7-diglucoside and kaempferol-3- <i>O</i> -vicianoside	Oxytocic activity <sup>[62]</sup>
Lecythidaceae	Beach Barringtonia, Fish-killer tree, Putat Laut	<i>Barringtonia asiatica</i> L	A1-barrinin, ranuncoside VIII, A1-barrigenin	Insect repellent <sup>[63]</sup> , Antibacterial and Antifungal <sup>[64]</sup> .
Lecythidaceae	Putat Kampong, Samundrapandu	<i>Barringtonia racemosa</i> (L.) K. Spreng	Nasimalun A and B, barringtonin, R1-barrigenol, R2-barrigenol, barringtogenol, barringtogenic acid	Antinociceptive <sup>[65]</sup> , Antibacterial <sup>[66]</sup> , Glucosidase and Amylase Inhibition <sup>[67]</sup> , Anticancer <sup>[68]</sup> and Cytotoxic <sup>[69]</sup> .
Leguminosae	Butterfly Tree	<i>Bauhinia purpurea</i> L.	Bauhiniastatins 1–4, bauhinoxepin C–J, bauhibenzofurin A, bauhispirorin A, bauhinol E	Antibacterial, Antifungal, Antimalarial, Cytotoxic <sup>[70]</sup> , Anticancer <sup>[71]</sup> , Anti-inflammatory, Antinociceptive, Antipyretic <sup>[72]</sup> and Thyroid hormone regulating <sup>[73]</sup>
Guttiferae	Indian Laurel, Penaga Laut, Borneo	<i>Calophyllum inophyllum</i> L.	Inophynone, canophyllol, canophyllic acid, calophyllolide,	Antibacterial <sup>[74]</sup> , Anticancer/ Antineoplastic, Antipsychotic, Anti-inflammatory <sup>[75]</sup> , Antiplatelet <sup>[76]</sup> , Antiviral <sup>[77]</sup> Photoprotective <sup>[78]</sup>

	Mahogany		inophyllolide, inophyllum B, C, P, and E, jacareubin, (+)-calanolide A, inocalophyllins A and B, calophinone, calophyllumin C, inophyllin A	and Molluscicidal <sup>[79]</sup>
Apocynaceae	Madagascar Periwinkle, Rose Periwinkle	<i>Catharanthus roseus</i> (L.) G. Don	Vinblastine, vincristine, leurosine, akuammicine, carosine, catharanthine, catharinine, catharine, catharosine, cathovaline, catharanthiole, vindoline, vindolinine, vincalécoblastine, secologanin, mauritianin, rosicine	Anticancer/ Antineoplastic <sup>[80]</sup> , Antioxidant <sup>[81]</sup> , Antiangiogenic <sup>[82]</sup> , Chemopreventive <sup>[83]</sup> , Hypoglycaemic <sup>[84]</sup> , and Wound healing <sup>[85]</sup>
Solanaceae	Chilli, Red Pepper <i>Capsicum</i>	<i>Capsicum annuum</i> L.	Capsaicin, capsicosides E–G, capsianosides 1–4, capsianosides VIII, IX, X, XIII, XV and XVI, solanidine, solanine, solasidine, scopoletin	Antibacterial <sup>[86]</sup> , Antifungal <sup>[87]</sup> , Anticancer <sup>[88]</sup> , Antioxidant <sup>[89]</sup> , Antiprotozoal <sup>[90]</sup> , Hypocholesterolaemic/Hypolipidemic <sup>[91]</sup> , Immunomodulatory <sup>[92]</sup> , Antimutagenic <sup>[93]</sup> and Pesticidal <sup>[94]</sup> .
Umbelliferae	Indian Pennywort, Asiatic Pennywort	<i>Centella asiatica</i> (L.) Urban	Asiaticoside, asiatic acid, brahmide acid, brahmide, centellic acid, centellose, indocentelloside, madecassic acid, madecassoside, thankuniside, vellarin, bayogenin, centellin, asiaticin, and centellicin	Antibacterial <sup>[95]</sup> , Antidepressant <sup>[96]</sup> , Antiemetic <sup>[97]</sup> , Antineoplastic <sup>[98]</sup> , Antioxidant <sup>[99]</sup> , Antithrombotic <sup>[100]</sup> , Anxiolytic <sup>[101]</sup> , Gastroprotective <sup>[102]</sup> , Immunomodulatory <sup>[103]</sup> , Antigenotoxic <sup>[104]</sup> , Nerve-regenerative <sup>[105]</sup> , Radioprotective <sup>[106]</sup> and Wound healing <sup>[107]</sup> .
Vitaceae	Grape Leaf, Veld Grape Flowers	<i>Cissus quadrangularis</i> L.	Quadrangularins A–C, $\delta$ -amyrin, $\delta$ -amyrone, resveratrol, piceatannol, pallidol, parthenocissine A	Antibacterial and Antioxidant <sup>[108]</sup> , Analgesic and Anti-inflammatory <sup>[109]</sup> , Antimalarial <sup>[110]</sup> , Gastroprotective <sup>[111]</sup> , and Antiosteoporotic <sup>[112]</sup> .
Gramineae	Lemon grass	<i>Cymbopogon citratus</i> (DC.) Stapf.	Citral, citronellal, cymbogonol, $\alpha$ -terpineol, citronellin, $\alpha$ -camphorene, geranial, isoorientin, isoscoparin	Analgesic <sup>[113]</sup> , Anthelmintic <sup>[114]</sup> , Antibacterial <sup>[115]</sup> , Antifungal <sup>[116]</sup> , Anticancer/ Antineoplastic <sup>[117]</sup> , Antimalarial <sup>[118]</sup> , Antioxidant <sup>[119]</sup> , Antiplatelet <sup>[120]</sup> , Hepatoprotective <sup>[121]</sup> , Hypoglycaemic <sup>[122]</sup> , Sedative <sup>[123]</sup> , Vasorelaxant <sup>[124]</sup> , Antimutagenic <sup>[125]</sup> , Insecticidal <sup>[126]</sup> , and Radioprotective <sup>[127]</sup> .
Leguminosae	Lablab Bean, Hyacinth Bean	<i>Dolichos lablab</i> L.	Dolichin, arabinogalactan 1 & 2, lablabosides A–F, phytin, pantothenic acid, saponin I, putrescine, spermidine, spermine	Antifungal, Antiviral <sup>[128]</sup> , and Haemagglutinating activities <sup>[129]</sup> .
Compositae	Elephant's Foot, Tutup Bumi, Tapak Sulaiman	<i>Elephantopus scaber</i> L.	Molephantin, crepaside E, deoxyelephantopin, stigmaterol, stigmasteryl, scabertopin, lupeol	Antibacterial <sup>[130]</sup> , Anticancer/ Antineoplastic <sup>[131]</sup> , Anti-inflammatory <sup>[132]</sup> , Antiviral <sup>[133]</sup> , and Hepatoprotective <sup>[134]</sup> .
Malvaceae	Cotton Rose, Chinese Rose	<i>Hibiscus mutabilis</i> L.	Isoquercitrin, hyperoside, rutin, quercetin, naringenin, tetracosanoic acid, daucosterol, salicylic acid, quercimeritrin, meratrin	Anti-inflammatory <sup>[135]</sup>
Malvaceae	Hawaiian Hibiscus, China Rose, Bunga Raya	<i>Hibiscus rosa-sinensis</i> L.	Gossypetin, anthocyanin, myristic acid, palmitic acid, ambrettolide, campesterol, methyl sterculate, malvalate	Anticonvulsant, Antianxiety <sup>[136]</sup> , Anticancer <sup>[137]</sup> , Antifertility <sup>[138]</sup> , Antioxidant <sup>[139]</sup> , Hepatoprotective <sup>[140]</sup> , Hypoglycaemic, Hypolipidaemic <sup>[141]</sup> , and Wound healing <sup>[142]</sup> .
Malvaceae	Linden Hibiscus, Sea	<i>Hibiscus tiliaceus</i> L.	Hibiscones A–D, hibiscusin, hibiscusamide,	Tyrosinase inhibitory <sup>[143]</sup> , Antioxidant <sup>[144]</sup> , and Cytotoxic <sup>[145]</sup> .

	Hibiscus, Mahoe		friedelin, epifriedelanol, pachysandiol A	
Balsaminaceae	Balsam Plant	<i>Impatiens balsamina</i> L.	Impatienol, pelargonidine, delphinidine, cyanidine, balsaminones A and B, hosenkosides F–O	Antibacterial <sup>[146]</sup> , Antihypotensive <sup>[147]</sup> , Antifungal <sup>[148]</sup> , Anti-inflammatory <sup>[149]</sup> , and Antipruritic <sup>[150]</sup> .
Gramineae	Lalang, Alang-alang, Speargrass	<i>Imperata cylindrica</i> (L.) P. Beauv.	Arborinone, arundoin, anemonin, isoorientin, imperanene, cylindol A and B, graminones A and B, cylindrene, isoarborinol, impecyloside	Antidiuretic <sup>[151]</sup> , Antibacterial, Anti-inflammatory <sup>[152]</sup> , Neuroprotective <sup>[153]</sup> .
Convolvulaceae	Beach Morning Glory, Goat's Foot Creeper, Bayhops	<i>Ipomoea pes-caprae</i> (L.) Sweet	Pescaproside A & B, pescapreins I–IX, stoloniferin III, E-phytol, $\beta$ -damascenone	Antiinflammatory, Analgesic <sup>[154]</sup> , Antidiabetic <sup>[155]</sup> , Antiplatelet aggregation <sup>[156]</sup> , Antiviral, Antivenom, Muscle relaxant <sup>[157]</sup> , Collagenase inhibitory activity <sup>[158]</sup> , and Prostaglandin synthesis inhibition <sup>[159]</sup>
Rubiaceae	Chinese Ixora	<i>Ixora chinensis</i> Lam.	Ixoric acid, ixoroside, ixoside, geniposidic acid	
Euphorbiaceae	Barbados Nut, Physic-nut	<i>Jatropha curcas</i> L.	Curcain, curcasin, curcacycline A, jatropholone A and B, heudelotinone, nobiletin, jatrocucin, curcin, curcusone B	Antidiabetic <sup>[160]</sup> , Anti-inflammatory <sup>[161]</sup> , Anticancer <sup>[162]</sup> , Antiprotozoal <sup>[163]</sup> , Antiviral <sup>[164]</sup> , Coagulant <sup>[165]</sup> , Abortifacient <sup>[166]</sup> , Haemolytic <sup>[167]</sup> , Lipolytic <sup>[168]</sup> , Insecticidal <sup>[169]</sup> , Molluscicidal <sup>[170]</sup> , and Wound healing <sup>[171]</sup> .
Cupressaceae	Chinese Juniper Leaves	<i>Juniperus chinensis</i> L.	Chinensiol, yatein, podophyllotoxin, thujopsenal, widdrol, sandaracopimaric acid, hinokiic acid	Antibacterial, Antifungal <sup>[172]</sup> , Antineoplastic <sup>[173]</sup> , Antioxidant <sup>[174]</sup> , Hypoglycemic and Hypolipidaemic <sup>[175]</sup> .
Zingiberaceae	Galangal, Sand Ginger, Kencur	<i>Kaempferia galanga</i> L.	Ethyl cinnamate, 1,8-cineole, $\delta$ -3-carene, $\alpha$ -pinene, camphene, borneol, cyene, $\alpha$ -terpineol, $\alpha$ -gurjunene, germacrenes, cadinenes, caryophyllenes	Antibacterial <sup>[176]</sup> , Antifungal <sup>[177]</sup> , Antihypertensive <sup>[178]</sup> , Anti-inflammatory <sup>[179]</sup> , Antineoplastic <sup>[180]</sup> , Antioxidant <sup>[181]</sup> , Antiprotozoal <sup>[182]</sup> , Depressant, Immunomodulatory <sup>[183]</sup> , Vasorelaxant <sup>[184]</sup> , Antiallergy <sup>[185]</sup> , Insect repellent <sup>[186]</sup> , Insecticidal <sup>[187]</sup> , and Wound healing <sup>[188]</sup> .
Caprifoliaceae	Japanese Honeysuckle, Jin Yin Hua	<i>Lonicera japonica</i> Thunb	Linalool, luteolin, geraniol, aromadendrene, eugenol, loniceroid A, B, C, L-phenylalaninosecologanin, (Z)-aldosecologanin, (E)-aldosecologanin	Antibacterial <sup>[189]</sup> , Anticancer/ Antineoplastic <sup>[190]</sup> , Antifungal <sup>[191]</sup> , Antihypertensive <sup>[192]</sup> , Anti-inflammatory <sup>[193]</sup> , Antioxidant <sup>[194]</sup> , Antiplatelet <sup>[195]</sup> , Antiviral <sup>[196]</sup> , Hepatoprotective <sup>[197]</sup> , and Antiatherogenic <sup>[198]</sup> .
Anacardiaceae	Mango, Mangga	<i>Mangifera indica</i> L.	Mangiferin, amboic acid, ambonic acid, arabinan, mangiferonic acid, quercetin, violaxanthin	Analgesic <sup>[199]</sup> , Anthelmintic <sup>[200]</sup> , Antibacterial <sup>[201]</sup> , Antiprotozoal, Anticonvulsant <sup>[202]</sup> , Antidiarrhoeal <sup>[203]</sup> , Antifungal <sup>[204]</sup> , Anti-inflammatory <sup>[205]</sup> , Anticancer <sup>[206]</sup> , Antioxidant <sup>[207]</sup> , Antiviral <sup>[208]</sup> , Gastroprotective <sup>[209]</sup> , Hepatoprotective <sup>[210]</sup> , Hypoglycaemic, Hypolipidaemic <sup>[211]</sup> , Immunomodulatory <sup>[212]</sup> , Larvicidal <sup>[213]</sup> , and Radioprotective <sup>[214]</sup> .
Euphorbiaceae	Tapioca, Cassava	<i>Manihot esculenta</i> Crantz	Linamarin, esculentic acid A and B, esculentin, esculin, scopoletin, scopolin, oxalic acid, saponins	Antifungal <sup>[215]</sup> , Antineoplastic <sup>[216]</sup> , Hepatoprotective <sup>[217]</sup> , Hypercholesterolaemic <sup>[218]</sup> , Antithyroidal <sup>[219]</sup> , Neurotoxic <sup>[220]</sup> , and Superoxide dismutase inhibition <sup>[221]</sup> .
Leguminosae	Touch-me-not, Sensitive Plant,	<i>Mimosa pudica</i> L.	Mimosine, 2-Hydroxymethyl-chroman-4-one	Anthelmintic <sup>[222]</sup> , Antibacterial <sup>[223]</sup> , Anticonvulsant <sup>[224]</sup> , Antidepressant <sup>[225]</sup> , Antifertility <sup>[226]</sup> , Antifungal <sup>[227]</sup> .

	Rumput Simalu			Hyperglycaemic <sup>[228]</sup> , Antioestrogenic <sup>[229]</sup> , and Antivenom <sup>[230]</sup> .
Nyctaginaceae	Four O'Clock Flower, Bunga Pukul Empat	<i>Mirabilis jalapa</i> L.	Trigonellin, 2'-O-methylabronisoflavone, 6-methoxyboeravinone C and betaxanthins	Antibacterial <sup>[231]</sup> , Antifungal <sup>[232]</sup> , Antineoplastic and Abortifacient <sup>[233]</sup> .
Liliaceae	Dwarf Lilyturf, Mondo Grass, Mai Men Dong	<i>Ophiopogon japonicus</i> Ker-Gawl	Ophiopogonin D and E, ophiopogonin C' and D', bornanol, ophiopogonanone A, C, E and F, ophiopogonin D	Antiarrhythmic <sup>[234]</sup> , Anti-inflammatory <sup>[235]</sup> , Antithrombotic <sup>[236]</sup> , Immunomodulatory <sup>[237]</sup> , Immunostimulatory <sup>[238]</sup> , Cardioprotective <sup>[239]</sup> , and Chemoprotective <sup>[240]</sup> .
Leguminosae	Jemerlang Laut, Yellow Flame, Yellow Flamboyant	<i>Peltophorum pterocarpum</i> Backer ex K. Heyne	Rhamnetin, hirsutidin, bergenin	Antibacterial and Antifungal <sup>[241]</sup> .
Polygonaceae	Water Pepper, Laksa Plant	<i>Persicaria hydropiper</i> L.	Rhamnazin, hydropiperoside, polygoidal, warburganal, isopolygoidal, isodrimeninol, drimenol, confertifolin	Analgesic <sup>[242]</sup> , Anthelmintic <sup>[243]</sup> , Antifertility <sup>[244]</sup> , Antifungal <sup>[245]</sup> , Antineoplastic <sup>[246]</sup> , Antioxidant <sup>[247]</sup> , Antimutagenic <sup>[248]</sup> , and Insect repellent <sup>[249]</sup> .
Euphorbiaceae	Pick-a-back, Carry Me Seed, Ye Xia Zhu	<i>Phyllanthus amarus</i> Schum. & Thonn	Phyllanthusin D, geraniin, corilagin, elaeocarpusin, amariin, amariinic acid, amarosterol-A and B, phyllantin, hypophyllantin	Analgesic <sup>[250]</sup> , Antibacterial <sup>[251]</sup> , Antidiarrhoeal <sup>[252]</sup> , Antifertility <sup>[253]</sup> , Antifungal <sup>[254]</sup> , Anti-inflammatory <sup>[255]</sup> , Antineoplastic <sup>[256]</sup> , Antioxidant <sup>[257]</sup> , Antiplasmodial <sup>[258]</sup> , Antiviral <sup>[259]</sup> , Diuretics <sup>[260]</sup> , Hepatoprotective <sup>[261]</sup> , Hypoglycaemic <sup>[262]</sup> , Inhibition of gastric lesion <sup>[263]</sup> , Antimutagenic <sup>[264]</sup> , Insecticidal <sup>[265]</sup> , and Radioprotective <sup>[266]</sup> .
Piperaceae	Pepper, Lada	<i>Piper nigrum</i> L.	Piperine, sabinene, nigramides A–S, pipertipine, piperitine; pellitorine, guineensine, piperettine, pipericine, dipiperamides A–C, pipnoohine, pipyahyine	Antibacterial <sup>[267]</sup> , Antidiabetic <sup>[268]</sup> , Antifungal <sup>[269]</sup> , Anti-inflammatory <sup>[270]</sup> , Antineoplastic <sup>[271]</sup> , Antioxidant <sup>[272]</sup> , Gastroprotective <sup>[273]</sup> , Hepatoprotective <sup>[274]</sup> , Hypolipidaemic <sup>[275]</sup> , Antimutagenic <sup>[276]</sup> , Antithyroidal <sup>[277]</sup> , and Insecticidal <sup>[278]</sup> .
Piperaceae	Wild Pepper, Kadok, Sirih Tanah	<i>Piper sarmentosum</i> Roxb.	Sarmentosine, sarmentine, (+)-sesamin, horsfieldin, brachystamide B, sarmentamide A, B, and C, (+)-asarinin, methyl piperate	Antifungal, Hypoglycaemic, Antiprotozoal, Antibacterial <sup>[279]</sup> , Antineoplastic <sup>[280]</sup> , Antipsychotic <sup>[281]</sup> , Insecticidal <sup>[282]</sup> , Antituberculosis <sup>[283]</sup> , Antimalarial <sup>[284]</sup> , and Antioxidant <sup>[285]</sup> .
Plantaginaceae	Common Plantain, Whiteman's Foot, Daun Sejumbok	<i>Plantago major</i> L.	Aucubin, catalpol, scutellarein, nepetin, chlorogenic acid, neochlorogenic acid, hispidulin, homoplantagin, nepitrin, ursolic acid	Analgesic <sup>[286]</sup> , Antibacterial <sup>[287]</sup> , Antidiarrhoeal <sup>[288]</sup> , Anti-inflammatory <sup>[289]</sup> , Anticancer <sup>[290]</sup> , Antioxidant <sup>[291]</sup> , Antiprotozoal <sup>[292]</sup> , Antiviral <sup>[293]</sup> , Immunomodulatory <sup>[294]</sup> , Immunostimulatory <sup>[295]</sup> , Proliferative <sup>[296]</sup> , Antiulcerogenic <sup>[297]</sup> , Antimutagenic <sup>[298]</sup> , Uterotonic <sup>[299]</sup> , and Wound healing <sup>[300]</sup> .
Euphorbiaceae	Castor Oil Plant, Castor Bean	<i>Ricinus communis</i> L.	Ricin, ricinoleic acid, ricinine, p-coumaric acid, ferulic acid, o-coumaric acids, syringic acid, cinnamic acids, stigmaterol, fucosterol	Antifertility <sup>[301]</sup> , Antioxidant, Anti-inflammatory <sup>[302]</sup> , Antipsychotic, Convulsant <sup>[303]</sup> , Antiviral <sup>[304]</sup> , Hepatoprotective <sup>[305]</sup> , Filaricidal <sup>[306]</sup> , Haemagglutination <sup>[307]</sup> , and Insecticidal <sup>[308]</sup> .
Myrtaceae	Rose Myrtle	<i>Rhodomyrtus tomentosa</i> (Ait.) Hassk	Rhodomyrtone, casuariin, castalagin, friedelin	Antibacterial <sup>[309]</sup> .
Commelinaceae	Purple-leaved Spider Wort, Moses-in-the-Cradle, Oyster Plant	<i>Rhoeo spathacea</i> (Sw.) Stearn		Anti-inflammatory <sup>[310]</sup> , Antiadrenergic <sup>[311]</sup> , and Uterostimulatory <sup>[312]</sup> .

Gramineae	Sugarcane, Tebu	<i>Saccharum officinarum</i> L.	Octacosanol, policosanol, orientin, tricin-7- <i>O</i> -glycoside, palmitic acid, oleic acid and linolenic acid	Analgesic, Anti-inflammatory <sup>[313]</sup> , Antioxidant, Anticancer <sup>[314]</sup> , Antiosteoporotic <sup>[315]</sup> , Antiplatelet <sup>[316]</sup> , Antithrombotic <sup>[317]</sup> , Hypocholesterolaemic <sup>[318]</sup> , Immunomodulatory <sup>[319]</sup> , Immunostimulatory <sup>[320]</sup> , Antiatherogenic <sup>[321]</sup> , and Myocardial protective <sup>[322]</sup> .
Euphorbiaceae	Sweet Leaf Bush, Cekup Manis, Daun Katuk	<i>Sauropus androgynus</i> (L.) Merr.	Sauroposide, (-)-isolariciresinol, corchoionoside C	Anthelmintic <sup>[323]</sup> .
Leguminosae	Scarlet Wisteria Tree, Red Wisteria, Daun Turi	<i>Sesbania grandiflora</i> Pers.	Grandiflorol, (+)-leucocyanidin, oleanolic acid, lutein, beta-carotene, violaxanthin, neoxanthin, zeaxanthin	Antibacterial <sup>[324]</sup> , Anxiolytic, Anticonvulsant <sup>[325]</sup> , Antiinflammatory, Hypotensive, Depressant, Diuretic <sup>[326]</sup> , Hepatoprotective <sup>[327]</sup> , Hypoglycaemic <sup>[328]</sup> , and Haemolytic <sup>[329]</sup> .
Solanaceae	Black Nightshade, Terong Meranti, Poison Berry	<i>Solanum nigrum</i> L.	Solanidine, $\alpha$ -, $\beta$ -, $\gamma$ -chaconine, desgalactotigonin, $\alpha$ -, $\beta$ -solamargine, diosgenin, solanadiol, $\alpha$ -, $\beta$ -, $\gamma$ -solanines, soladulcidine, solanocapsine, $\alpha$ -, $\beta$ -solansodamine, solasodine, $\alpha$ -solasonine, tigogenin, tomatidenol, uttronins A and B, uttrosides A and B, solanigraside A–H	Antibacterial <sup>[330]</sup> , Anticancer/antineoplastic <sup>[331]</sup> , Antiulcerogenic <sup>[332]</sup> , Antinociceptive, Anti-inflammatory <sup>[333]</sup> , Antioxidant <sup>[334]</sup> , Antiviral <sup>[335]</sup> , Depressant <sup>[336]</sup> , Hepatoprotective <sup>[337]</sup> , Hypolipidaemic <sup>[338]</sup> , Antimutagenic <sup>[339]</sup> , Enzyme modulation <sup>[340]</sup> , Larvicidal, Molluscicidal <sup>[341]</sup> , and Parasitocidal <sup>[342]</sup> .
Apocynaceae	Yellow Oleander, Trumpet Flower	<i>Thevetia peruviana</i> (Pers.) K. Schum.	Thevetins A and B, thevetosides, acetylperuvoside, epiperuviol, perusitin, theveneriin, thevebioside, thevefolin, pervianoside I–III	Hepatotoxicity and Nephrotoxicity, cardiotoxic, Antiarrhythmic <sup>[343]</sup> , Antifungal <sup>[344]</sup> , Larvicidal <sup>[345]</sup> , and Molluscicidal <sup>[346]</sup> .
Menispermaceae	Akar Putarwali, Batang Wali <i>Tinospora</i>	<i>Tinospora crispa</i> (L.) Diels	Boropetol B, borapetoside B, C & F, jatrorrhizine, magnoflorine, palmatine, protoberberine, tembolarine, diosmetin, cycloeucalenol, cycloeucalenone	Anti-inflammatory <sup>[347]</sup> , Antioxidant <sup>[348]</sup> , Antimalarial <sup>[349]</sup> , Antiprotozoal <sup>[350]</sup> , and Hypoglycaemic <sup>[351]</sup> .
Verbenaceae	Round Leaf Chastetree, Beach Vitex	<i>Vitex rotundifolia</i> L. f.	Rotundifuran, prerotundifuran, vitexilactone, previtexilactone, vitexicarpin, vitricine, vitetrifolins D–G, vitexifolins A–E, isoambreinolide	Analgesic <sup>[352]</sup> , Antibacterial <sup>[353]</sup> , Antineoplastic, Antifungal, Insect repellent <sup>[354]</sup> , Anti-inflammatory <sup>[355]</sup> , Antinociceptive <sup>[356]</sup> , Antioxidant <sup>[357]</sup> , Antiprotozoal <sup>[358]</sup> , Hypotensive <sup>[359]</sup> , Immunomodulatory <sup>[360]</sup> , Antimutagenic <sup>[361]</sup> .
Zingiberaceae	Common Ginger	<i>Zingiber officinale</i> Roscoe	Gingerol, zingiberene, farnesene, camphene, neral, nerol, 1,8-cineole, geranial, geraniol, geranyl acetate	Analgesic, Anti-inflammatory <sup>[362]</sup> , Anthelmintic <sup>[363]</sup> , Antiarthritic <sup>[364]</sup> , Anticancer <sup>[365]</sup> , Antidiabetic <sup>[366]</sup> , Antidiarrhoeal <sup>[367]</sup> , Antiemetic <sup>[368]</sup> , Antihyperlipidaemic <sup>[369]</sup> , Antihypertensive <sup>[370]</sup> , Antimicrobial <sup>[371]</sup> , Antioxidant <sup>[372]</sup> , Antiplatelet <sup>[373]</sup> , Antispasmodic <sup>[374]</sup> , Antiulcer <sup>[375]</sup> , Antiviral <sup>[376]</sup> , Anxiolytic, Hepatoprotective <sup>[377]</sup> , Hypocholesterolaemic <sup>[378]</sup> , Hypoglycaemic <sup>[379]</sup> , Hypolipidaemic <sup>[380]</sup> , Hypotensive <sup>[381]</sup> , Immunomodulatory <sup>[382]</sup> , Neuroprotective <sup>[383]</sup> , Insect repellent <sup>[384]</sup> , and Radioprotective <sup>[385]</sup> .

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