

# Phytochemistry and biological studies of the endemic Hawaiian plants

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**Table S1.** The list of endemic Hawaiian plants has been reported.

No.	Benjamin C. Stone in 1967 [5]	Hawaiian Ethnobotany online database (Bishop Museum, 2023) [7]	The Hawaiian Islands website, National Museum of Natural History (NMNH) [6]	All endemic Hawaiian plants [5–7]
1	<i>Bidens cosmoides</i>	<i>Bidens amplexens</i>	<i>Argemone glauca</i> var. <i>glauca</i>	<i>Argemone glauca</i> var. <i>glauca</i>
2	<i>Charpentiera obovata</i>	<i>Bidens asymmetrica</i>	<i>Bidens amplexens</i>	<i>Bidens amplexens</i>
3	<i>Hillebrandia sandwicensis</i>	<i>Bidens campylotheca</i>	<i>Bidens asymmetrica</i>	<i>Bidens asymmetrica</i>
4	<i>Platydesma campanulatum</i> , <i>P. spathulatum</i> , <i>P. campanulata</i> (syn. <i>Melicope spathulata</i> )	<i>Bidens cervicata</i>	<i>Bidens campylotheca</i> subsp. <i>campylotheca</i>	<i>Bidens campylotheca</i>
5		<i>Bidens conjuncta</i>	<i>Bidens campylotheca</i> subsp. <i>pentamera</i>	<i>Bidens campylotheca</i> subsp. <i>campylotheca</i>
6		<i>Bidens cosmoides</i>	<i>Bidens campylotheca</i> subsp. <i>waihoiensis</i>	<i>Bidens campylotheca</i> subsp. <i>pentamera</i>
7		<i>Bidens forbesii</i>	<i>Bidens cervicata</i>	<i>Bidens campylotheca</i> subsp. <i>waihoiensis</i>
8		<i>Bidens hawaiiensis</i>	<i>Bidens conjuncta</i>	<i>Bidens cervicata</i>
9		<i>Bidens hillebrandiana</i>	<i>Bidens cosmoides</i>	<i>Bidens conjuncta</i>
10		<i>Bidens macrocarpa</i>	<i>Bidens forbesii</i> subsp. <i>forbesii</i>	<i>Bidens cosmoides</i>
11		<i>Bidens mauiensis</i>	<i>Bidens forbesii</i> subsp. <i>kahiliensis</i>	<i>Bidens forbesii</i>
12		<i>Bidens menziesii</i>	<i>Bidens hawaiiensis</i>	<i>Bidens forbesii</i> subsp. <i>forbesii</i>
13		<i>Bidens micrantha</i>	<i>Bidens hillebrandiana</i> subsp. <i>polycephala</i>	<i>Bidens forbesii</i> subsp. <i>kahiliensis</i>
14		<i>Bidens molokaiensis</i>	<i>Bidens macrocarpa</i>	<i>Bidens hawaiiensis</i>
15		<i>Bidens populifolia</i>	<i>Bidens mauiensis</i>	<i>Bidens hillebrandiana</i>
16		<i>Bidens sandwicensis</i>	<i>Bidens menziesii</i> subsp. <i>filiformis</i>	<i>Bidens hillebrandiana</i> subsp. <i>polycephala</i>
17		<i>Bidens torta</i>	<i>Bidens menziesii</i> subsp. <i>menziesii</i>	<i>Bidens macrocarpa</i>
18		<i>Bidens valida</i>	<i>Bidens micrantha</i> subsp. <i>ctenophylla</i>	<i>Bidens mauiensis</i>
19		<i>Bidens wiebkei</i>	<i>Bidens micrantha</i> subsp. <i>kalealaha</i>	<i>Bidens menziesii</i>
20		<i>Charpentiera obovata</i>	<i>Bidens micrantha</i> subsp. <i>micrantha</i>	<i>Bidens menziesii</i> subsp. <i>filiformis</i>
21		<i>Clermontia persicifolia</i>	<i>Bidens molokaiensis</i>	<i>Bidens menziesii</i> subsp. <i>menziesii</i>
22		<i>Cuscuta sandwichiana</i>	<i>Bidens populifolia</i>	<i>Bidens micrantha</i>
23		<i>Dubautia arborea</i>	<i>Bidens sandwicensis</i> subsp. <i>confusa</i>	<i>Bidens micrantha</i> subsp. <i>ctenophylla</i>
24		<i>Gardenia brighamii</i>	<i>Bidens sandwicensis</i> subsp. <i>sandwicensis</i>	<i>Bidens micrantha</i> subsp. <i>kalealaha</i>
25		<i>Melicope barbigera</i> (syn. <i>Pelea barbigera</i> )	<i>Bidens torta</i>	<i>Bidens micrantha</i> subsp. <i>micrantha</i>
26		<i>Pipturus albidus</i>	<i>Bidens valida</i>	<i>Bidens molokaiensis</i>

No.	Benjamin C. Stone in 1967 [5]	Hawaiian Ethnobotany online database (Bishop Museum, 2023) [7]	The Hawaiian Islands website, National Museum of Natural History (NMNH) [6]	All endemic Hawaiian plants [5–7]
27		<i>Psychotria hawaiiensis</i>	<i>Bidens wiebkei</i>	<i>Bidens populifolia</i>
28		<i>Rauvolfia sandwicensis</i>	<i>Charpentiera obovata</i>	<i>Bidens sandwicensis</i>
29		<i>Santalum paniculatum</i>	<i>Clermontia persicifolia</i>	<i>Bidens sandwicensis</i> subsp. <i>confusa</i>
30		<i>Sophora chrysophylla</i>	<i>Coprosma ernodeides</i>	<i>Bidens sandwicensis</i> subsp. <i>sandwicensis</i>
31		<i>Vaccinium calycinum</i>	<i>Cuscuta sandwichiana</i>	<i>Bidens torta</i>
32		<i>Vaccinium reticulatum</i>	<i>Dryopteris mauiensis</i>	<i>Bidens valida</i>
33		<i>Wikstroemia monticola</i>	<i>Dubautia arborea</i>	<i>Bidens wiebkei</i>
34		<i>Wikstroemia uva-ursi</i>	<i>Erythrina sandwicensis</i>	<i>Charpentiera obovata</i>
35		<i>Zanthoxylum dipetalum</i>	<i>Hesperomannia arborescens</i>	<i>Clermontia persicifolia</i>
36		<i>Zanthoxylum hawaiiense</i>	<i>Hillebrandia sandwicensis</i>	<i>Coprosma ernodeides</i>
37		<i>Zanthoxylum kauaense</i>	<i>Lobelia yuccoides</i>	<i>Cuscuta sandwichiana</i>
38			<i>Lysimachia daphnoides</i>	<i>Dryopteris mauiensis</i>
39			<i>Lysimachia filifolia</i>	<i>Dubautia arborea</i>
40			<i>Lysimachia glutinosa</i>	<i>Erythrina sandwicensis</i>
41			<i>Lysimachia hillebrandii</i>	<i>Gardenia brighamii</i>
42			<i>Lysimachia iniki</i>	<i>Hesperomannia arborescens</i>
43			<i>Lysimachia kalalauensis</i>	<i>Hillebrandia sandwicensis</i>
44			<i>Lysimachia maxima</i>	<i>Lobelia yuccoides</i>
45			<i>Lysimachia ovoidea</i>	<i>Lysimachia daphnoides</i>
46			<i>Lysimachia pendens</i>	<i>Lysimachia filifolia</i>
47			<i>Lysimachia remyi</i>	<i>Lysimachia glutinosa</i>
48			<i>Lysimachia scopulensis</i>	<i>Lysimachia hillebrandii</i>
49			<i>Lysimachia waianaeensis</i>	<i>Lysimachia iniki</i>
50			<i>Phyllanthus distichus</i>	<i>Lysimachia kalalauensis</i>
51			<i>Pipturus albidus</i>	<i>Lysimachia maxima</i>
52			<i>Platydesma campanulatum</i> , <i>P. spathulatum</i> , <i>P. campanulata</i> (syn. <i>Melicope spathulata</i> )	<i>Lysimachia ovoidea</i>
53			<i>Rauvolfia sandwicensis</i>	<i>Lysimachia pendens</i>
54			<i>Sophora chrysophylla</i>	<i>Lysimachia remyi</i>
55			<i>Vaccinium calycinum</i>	<i>Lysimachia scopulensis</i>
56			<i>Vaccinium reticulatum</i>	<i>Lysimachia waianaeensis</i>

No.	Benjamin C. Stone in 1967 [5]	Hawaiian Ethnobotany online database (Bishop Museum, 2023) [7]	The Hawaiian Islands website, National Museum of Natural History (NMNH) [6]	All endemic Hawaiian plants [5–7]
57			<i>Wikstroemia monticola</i>	<i>Melicope barbiger</i> a (syn. <i>Pelea barbiger</i> a)
58			<i>Wilkesia gymnoxiphium</i>	<i>Phyllanthus distichus</i>
59			<i>Wilkesia hobdyi</i>	<i>Pipturus albidus</i>
60			<i>Zanthoxylum hawaiiense</i>	<i>Platydesma campanulatum</i> , <i>P. spathulatum</i> , <i>P. campanulata</i> (syn. <i>Melicope spathulata</i> )
61			<i>Zanthoxylum kauaense</i>	<i>Psychotria hawaiiensis</i>
62				<i>Rauvolfia sandwicensis</i>
63				<i>Santalum paniculatum</i>
64				<i>Sophora chrysophylla</i>
65				<i>Vaccinium calycinum</i>
66				<i>Vaccinium reticulatum</i>
67				<i>Wikstroemia monticola</i>
68				<i>Wikstroemia uva-ursi</i>
69				<i>Wilkesia gymnoxiphium</i>
70				<i>Wilkesia hobdyi</i>
71				<i>Zanthoxylum dipetalum</i>
72				<i>Zanthoxylum hawaiiense</i>
73				<i>Zanthoxylum kauaense</i>

**Table S2.** Phytochemistry and biological studies of the endemic Hawaiian plants.

No.	Plant	Parts used	Chemical components	Biological activity	Reference
1	<i>Argemone glauca</i> var. <i>glauca</i>	NA	Alkaloids	NA	[9]
2	<i>Bidens</i> genus				
	2.1 <i>Bidens amplexens</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.2 <i>Bidens asymmetrica</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.3 <i>Bidens campylotheca</i> subsp. <i>campylotheca</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.4 <i>Bidens campylotheca</i> subsp. <i>pentamera</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.5 <i>Bidens campylotheca</i> subsp. <i>waihoiensis</i>	Leaves and flowers	Flavonoids	NA	[13]
	2.6 <i>Bidens cervicata</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.7 <i>Bidens conjuncta</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.8 <i>Bidens cosmoides</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.9 <i>Bidens forbesii</i> subsp. <i>forbesii</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.10 <i>Bidens forbesii</i> subsp. <i>kahiliensis</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.11 <i>Bidens hawaiiensis</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.12 <i>Bidens hillebrandiana</i>	Leaves and flowers	Flavonoids	NA	[13]
	2.13 <i>Bidens hillebrandiana</i> subsp. <i>polycephala</i>	Leaves and flowers	Flavonoids	NA	[13]
	2.14 <i>Bidens macrocarpa</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.15 <i>Bidens mauiensis</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.16 <i>Bidens menziesii</i> subsp. <i>filiformis</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.17 <i>Bidens menziesii</i> subsp. <i>menziesii</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.18 <i>Bidens micrantha</i> subsp. <i>ctenophylla</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.19 <i>Bidens micrantha</i> subsp. <i>kalealaha</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.20 <i>Bidens micrantha</i> subsp. <i>micrantha</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.21 <i>Bidens molokaiensis</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.22 <i>Bidens populifolia</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]

No.	Plant	Parts used	Chemical components	Biological activity	Reference
	2.23 <i>Bidens sandvicensis</i> subsp. <i>confusa</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.24 <i>Bidens sandvicensis</i> subsp. <i>sandvicensis</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.25 <i>Bidens torta</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.26 <i>Bidens valida</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
	2.27 <i>Bidens wiebkei</i>	Leaves, roots, flowers	Polyacetylenes, flavonoids	NA	[12,13]
3	<i>Charpentiera obovata</i>	Roots, barks	Alkaloids	NA	[14,15]
4	<i>Clermontia persicifolia</i>	Leaves	Flavonoids	NA	[18]
5	<i>Coprosma ernodeoides</i>	Leaves, berries	Iridoid glycosides	Antioxidant properties	[19]
6	<i>Cuscuta sandwichiana</i>	NA	Macrocyclic glycoresins	Cytotoxicity	[21]
		Stems	NA	Antiviral activity against human immunodeficiency Virus Type-1 (HIV-1)	[25]
7	<i>Dryopteris mauiensis</i>	NA	Phenolics	NA	[28]
8	<i>Dubautia arborea</i>	Leaves	Flavonoids	NA	[29]
9	<i>Erythrina sandwicensis</i>	Seeds	Alkaloids	NA	[33–35]
		Fungus-inoculated leaves	Pterocarpanes	NA	[36]
10	<i>Gardenia brighamii</i>	Leaves	NA	Antifungal activity against <i>Fusarium</i> species	[39]
11	<i>Hesperomannia arborescens</i>	Leaves	Flavonols, flavonoid glucosides	NA	[41]
12	<i>Hillebrandia sandwicensis</i>	Leaves	C-glycosyl flavones	NA	[42]
13	<i>Lobelia yuccoides</i>	Roots, stem barks	Alkaloids	NA	[43]
14	<i>Lysimachia</i> genus				
	14.1 <i>Lysimachia daphnoides</i>	Arial part	Flavonol glycosides	NA	[45]
	14.2 <i>Lysimachia filifolia</i>	Arial part	Flavonol glycosides	NA	[45]
	14.3 <i>Lysimachia glutinosa</i>	Arial part	Flavonol glycosides	NA	[45]
	14.4 <i>Lysimachia hillebrandii</i>	Arial part	Flavonol glycosides	NA	[45]
	14.5 <i>Lysimachia iniki</i>	Arial part	Flavonol glycosides	NA	[45]
	14.6 <i>Lysimachia kalalauensis</i>	Arial part	Flavonol glycosides	NA	[45]
	14.7 <i>Lysimachia maxima</i>	Arial part	Flavonol glycosides	NA	[45]
	14.8 <i>Lysimachia ovoidea</i>	Arial part	Flavonol glycosides	NA	[45]

No.	Plant	Parts used	Chemical components	Biological activity	Reference
	14.9 <i>Lysimachia pendens</i>	Arial part	Flavonol glycosides	NA	[45]
	14.10 <i>Lysimachia remyi</i>	Arial part	Flavonol glycosides	NA	[45]
	14.11 <i>Lysimachia scopulensis</i>	Arial part	Flavonol glycosides	NA	[45]
	14.12 <i>Lysimachia waianaeensis</i>	Arial part	Flavonol glycosides	NA	[45]
15	<i>Melicope barbigera</i> (syn. <i>Pelea barbigera</i> )	Leaves	Acetophenones, 2H-benzopyranes, isomeric melifoliones	Cytotoxic activities against the A2780 human ovarian cancer cell line	[48]
16	<i>Phyllanthus distichus</i>	Fruits	NA	Antimicrobial activity	[51]
		Fruits	Alkaloids, glycosides, phenolic compounds, reducing sugars, saponins, polyphenols, tannins, flavonoids, and terpenes	Antibacterial activity and antioxidant activities	[52]
		Leaves	NA	Hypoglycemic and antidiabetic properties	[53]
17	<i>Pipturus albidus</i>	Leaves	NA	Anti-microbial activity, anti-bacterial activity, and anti-fungal properties	[25]
		Leaves, bark, stems	NA	Antiviral activity	[57]
		Leaves	Macronutrients and minerals Phenolic acids	Antioxidant Activity	[54,61]
		Leaves	NA	Total antioxidant capacity	[61]
		Leaves	NA	Antioxidant, anticancer, and chemo preventive properties	[62]
		Leaves, bark, stems	Polyphenolics	Anti-viral, anti-fungal, anti-microbial, and anti-inflammatory attributes	[57]
		Leaves	NA	Antibacterial, antiviral properties, antioxidant effects, mild natural laxative properties, anti-allergic effects, promoting cardiovascular and liver health, and reducing stress levels	[58]
18	<i>Platydesma spathulatum</i> or <i>P. campanulatum</i> or <i>P. campanulata</i> (syn. <i>Melicope spathulata</i> )	Roots, stem barks, leaves	Alkaloids, furoquinolines	NA	[64]
19	<i>Psychotria hawaiiensis</i>	Barks, leaves	NA	Anti-viral against Herpes Simplex Virus 1 and 2A, anti-fungal, and anti-bacterial activities	[54]

No.	Plant	Parts used	Chemical components	Biological activity	Reference
		Barks, leaves	NA	Antiviral activity against human immunodeficiency virus type-1 (HIV-1)	[25]
20	<i>Rauvolfia sandwicensis</i>	Roots	Alkaloids	NA	[68,69]
21	<i>Santalum paniculatum</i>	Woods	Essential oils (terpenoids)	NA	[72]
		Leaves	NA	Antimicrobial activity against <i>Staphylococcus aureus</i>	[73]
		NA	Essential oils (terpenoids)	NA	[74]
		NA	Essential oils (terpenoids)	Potential bioactivity against <i>Tribolium castaneum</i> (red flour beetle)	[75]
22	<i>Sophora chrysophylla</i>	Barks	Quinolizidine alkaloids	NA	[76]
		Leaves, stems, seeds	Lupin alkaloids	NA	[77]
		Roots	Isoflavones and 6a-hydroxypterocarpan	NA	[78]
23	<i>Vaccinium</i> genus				
	23.1 <i>Vaccinium calycinum</i>	Leaves	Flavonoid glycosides, cinnamic ester	NA	[81]
		Fruits	NA	Antioxidant activity	[82]
		Fruits	NA	Antimicrobial activity against <i>Listeria monocytogenes</i>	[83]
		Fruits	Phenolics and anthocyanins	Antimicrobial activity against <i>Listeria monocytogenes</i> and <i>E. coli</i>	[84]
	23.2 <i>Vaccinium reticulatum</i>	Leaves	Flavonoid glycosides, cinnamic ester	NA	[81]
		Fruits	NA	Antioxidant activity	[82]
24	<i>Wikstroemia</i> genus				
	24.1 <i>Wikstroemia monticola</i>	Woody stems, barks	Daphnane diterpenes	Antitumor activity	[86–88]
	24.2 <i>Wikstroemia uva-ursi</i>	Whole plants	Lignans	Antitumor activity against the P-388 lymphocytic leukemia (3PS)	[86,94]
25	<i>Wilkesia</i> genus				
	25.1 <i>Wilkesia gymnoxiphium</i>	Leaves	Flavonoids (minor quantitative)	NA	[99]
	25.2 <i>Wilkesia hobdyi</i>	Leaves	Flavonoids (minor quantitative)	NA	[99]
26	<i>Zanthoxylum</i> genus				



No.	Plant	Parts used	Chemical components	Biological activity	Reference
26.1	<i>Zanthoxylum dipetalum</i>	Root barks, root woods	Alkaloids, pyranocoumarins, triterpene, and flavonoid	NA	[101]
		Root barks	Pyranocoumarin and dipyrancoumarin	NA	[102]
		Leaves	Acyl histamines and protopine-type alkaloid	NA	[103]
		Leaves, pericarps	Volatile compounds	Insecticidal activity (ovicidal properties)	[105,106]
26.2	<i>Zanthoxylum hawaiiense</i>	Leaves, pericarps	Volatile compounds	Insecticidal activity (ovicidal properties)	[105,106]
26.3	<i>Zanthoxylum kauaense</i>	Leaves, pericarps	Volatile compounds	Insecticidal activity (ovicidal properties)	[105,106]

NA= Not available