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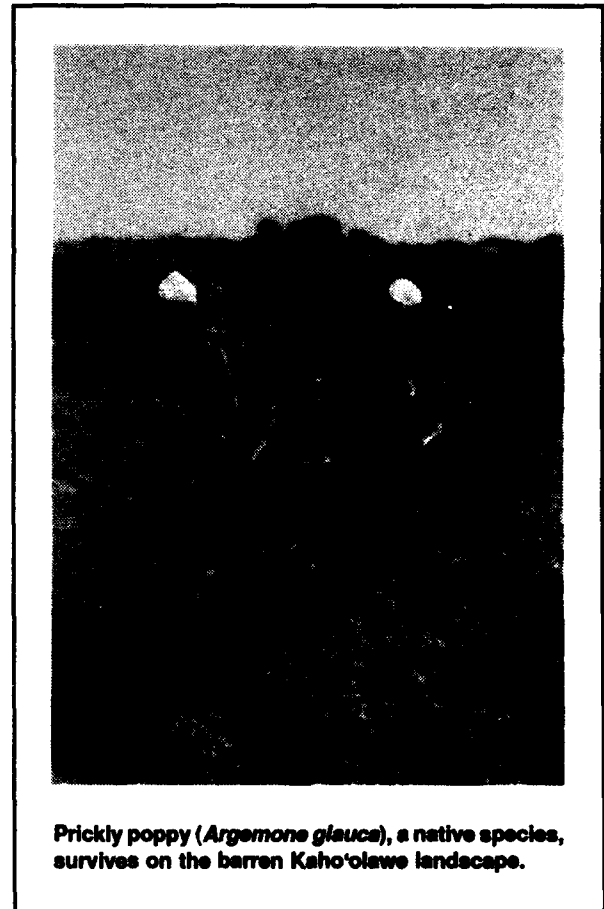
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# The Plants of Kaho'olawe

by  
Steven D. Warren  
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For at least two centuries prior to World War II, the Hawaiian island of Kaho'olawe suffered the ravages of periodic wildfires, slash-and-burn agriculture, and severe overgrazing, leaving the island almost barren of vegetation. With the entry of the United States into World War II, Kaho'olawe, then part of the U.S. Territory of Hawaii, became a focal point for military training in the South Pacific. In 1953 the uninhabited island was placed under the jurisdiction of the U.S. Navy. Today, legislation is in progress to return the island to the State of Hawaii.

From 1987 to 1993, the U.S. Army Construction Engineering Research Laboratories (USACERL) worked with the U.S. Navy to develop a cost-effective land rehabilitation prescription for Kaho'olawe. As part of that effort, a study was undertaken to determine, as nearly as possible, the original plant species of the island. This report, containing former and extant plant species, is the product of that study. The list of plant species will be included in a natural resources data base for use in future land rehabilitation projects on Kaho'olawe.



Prickly poppy (*Argemone glauca*), a native species, survives on the barren Kaho'olawe landscape.

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## Foreword

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The work was performed by the Environmental Natural Resources Division (EN) of the Environmental Sustainment Laboratory (EL), U.S. Army Construction Engineering Research Laboratories (USACERL). The USACERL principal investigator was Dr. Steven D. Warren. Dr. William Severinghaus is Acting Chief, CECER-EN, and Dr. William Goran is Chief, CECER-EL. The USACERL technical editor was Thomas E. Rice, Information Management Office.

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LTC David J. Rehbein is Commander, USACERL, and Dr. L.R. Shaffer is Director.

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# 1 Introduction

## Background

Researchers have speculated that much of the Hawaiian island of Kaho'olawe was at one time covered with a dryland scrub forest similar to remnants of that ecotype presently found on the 'Ewa Plains of Oahu and the Kawaihae-Waimea area on Hawaii (15). But periodic wildfires, slash-and-burn agriculture, and severe overgrazing ravaged Kaho'olawe for at least two centuries before World War II; today, the island is almost barren of natural vegetation. Approximately one-third of the island is virtually denuded; the remainder is dominated by *kiawe* (*Prosopis pallida*), an introduced shrub, and a variety of introduced grasses and forbs. The only native species contributing significant biomass are *pili* grass (*Heteropogon contortus*) and the shrubs *ma'o* (*Gossypium tomentosum* and *Abutilon incanum*), *'ilima* (*Sida fallax*), and *'uhaloa* (*Waltheria indica*).

From 1987 to 1993, the U.S. Army Construction Engineering Research Laboratories (USACERL) worked with the U.S. Navy to develop a cost-effective land rehabilitation prescription for Kaho'olawe. As part of that effort, a study was undertaken to determine, as nearly as possible, the original plant species of the island. This report, containing former and extant plant species, is the product of that study.

## Objective

The objective of this study was to provide a list of all plant species that have existed on Kaho'olawe as part of a natural resources data base for use in future land rehabilitation efforts on the island.

## Approach

A literature search and field observations were compiled to determine the historical presence and fate of the plants of Kaho'olawe.

## 2 A Vegetative History

### Pre-European Conditions

The demise of Kaho'olawe began long before the arrival of European explorers. The cumulative effects of slash-and-burn agriculture practiced by the early Hawaiian people undoubtedly contributed to the loss of the scrub forest (24). Intense interisland warfare in the years just prior to the arrival of European explorers left the island "nearly over-run with weeds, and exhausted of . . . inhabitants" (36). In 1779, members of the crew of Captain James Cook described Kaho'olawe as "barren," "desolate," and an "altogether poor island" (12).

### The Ranching Era

The same explorers that lamented the poor condition of Kaho'olawe unwittingly contributed to its further decline. Captain Cook and other early visitors introduced goats to the Hawaiian islands as gifts to the native monarchy near the end of the 18th century. It has been speculated that some of the goats were subsequently placed on Kaho'olawe (6). Although numerous visits were made to Kaho'olawe over the next half-century, the presence of goats was not actually recorded until 1850 when the explorer E.T. Perkins characterized the island as "desolate in the extreme; the reddish, sterile soil being unrelieved by either tree or shrub" (29). Perkins mentions a grove of "akokoa shrubs" (*Chamaesyce* spp.) and a few stunted *wiliwili* trees (*Erythrina sandwicensis*), many of the former having died after being stripped of bark by goats. Some sizeable expanses of grassland were also present, at least on the lower slopes. Perkins mentions that a group of his men set fire to the grass as a signal to their companions, and that the fire burned for nearly a week, serving as a beacon to passing ships.

In 1858, William F. Allen sighted and killed a single goat, although he speculated that there were considerably more (1). Allen also reported to R.C. Wyllie, co-owner of a 20-year lease of Kaho'olawe, that the island could support 20,000 sheep. The first sheep apparently arrived the following year (48), beginning a series of ill-fated ranching enterprises. By 1875 there were approximately 20,000 sheep and several hundred goats present (2). Six years later, cattle were introduced (4), and by 1884 there were about 9000 goats, 2000 sheep, 200 head of cattle, and 40 horses on the island (11).

The many years of human and animal activity scarred Kaho'olawe's soil. Severe wind erosion was noted as early as 1880 (3), with reports of red clouds of dust

being blown 30 to 40 miles out to sea. By 1910 it was apparent that the carrying capacity of the island—the ability of the environment to support livestock—had been vastly exceeded. To protect the limited remaining resources, the island was declared a forest reserve (21). Numerous forays were organized over the next 8 years to eradicate the livestock, but the goats and sheep persisted. There were also unsuccessful attempts to reestablish woody vegetation (7). Charles N. Forbes of the Bernice Pauahi Bishop Museum visited Kaho'olawe during this period and recorded a total of 16 native plant species and 15 introduced species (17).

By 1918 the economic demand for Kaho'olawe as a cattle ranch, and the failed attempts to eradicate the goats, the unsuccessful reestablishment of trees, and lack of funds to continue these efforts led the governor of the Hawaiian Islands to withdraw Kaho'olawe from the forest reserve (8). Cattle were reintroduced that year under the terms of a lease requiring the elimination of the goat population and the establishment of steps toward reforestation. Over the next two decades, thousands of native and introduced tree seedlings were planted (10) but with limited success (30). Also, several tons of native and introduced grass and forb seeds were planted (10). More than 13,000 goats were either removed or destroyed. Despite these gallant efforts, the goats persisted in small numbers and great clouds of eroded dust continued to blow off the island (23). In 1931 E.H. Bryan recorded 33 species of plants, adding 3 native species and 12 introduced species to the list recorded by Forbes in 1913 (13).

## **The Military Era**

With the onset of World War II, the U.S. military subleased Kaho'olawe for training purposes. The cattle and horses were subsequently removed, but without ranch hands to control them, the small bands of sheep and goats reproduced rapidly. In 1953 President Eisenhower issued an Executive Order "reserving Kaho'olawe. . . for the use of the United States for naval purposes and placing it under the jurisdiction of the Secretary of the Navy" until such a time as it might be "no longer needed for naval purposes. . ." The Executive Order also required the Navy to "eradicate from the island all cloven-hooved animals. . ." or limit their population to less than 200.

When compared to the results of overgrazing, the effects of military activity on the flora of Kaho'olawe have been minimal. The Navy instituted a successful program to eradicate the goats and sheep (16) and established several revegetation projects that have allowed the vegetation to begin a remarkable recovery. In 1978 a botanical survey revealed 106 plant species living on Kaho'olawe, including 27 endemic and indigenous species (16). Two years later, 52 species, including 5



more natives, were added to the list (14). A survey conducted by the Hawai'i Heritage Program in 1992 recorded a total of 139 species, adding 5 native species, including a previously undescribed genus (18).

### 3 Species Checklist

The checklist provided in this report combines information from all of the aforementioned surveys with numerous other published accounts of species living on Kaho'olawe. The checklist includes species that have been cultivated for food, fiber, or ornamental purposes, and those that have been introduced to Kaho'olawe for land rehabilitation and erosion control. Species known to have been planted by seed during revegetation trials, but for which there is no evidence of germination, have been excluded. Species known only from drift material or archaeological sites have been excluded because it is impossible to conclude that they ever lived on Kaho'olawe. First-hand accounts of sightings or collections were the preferred sources of information due to the unreliability of second-hand information. However, even some first-hand accounts are inconclusive, especially those referring to species by common names only. Because there is often more than one species with the same common name, such references are included only where there is a reasonable degree of assurance that the common name corresponds to a single species.

The origin of each species in the checklist is listed as follows:

- E Species occurring naturally only on Kaho'olawe or elsewhere within the Hawaiian Archipelago (*i.e., endemic*)
- I Species occurring naturally on Kaho'olawe, but also known to occur naturally outside the Hawaiian Archipelago (*i.e., indigenous*)
- N Species introduced to Hawaii by man that have been considered thoroughly established on Kaho'olawe at some time (*i.e., naturalized*)
- C Species that have been *cultivated* on Kaho'olawe for food, fiber, or as an ornamental, but have not become naturalized
- R Species introduced to Kaho'olawe for the purpose of land *rehabilitation* that have not become naturalized

For endemic and indigenous species, the earliest published source documenting occurrence on Kaho'olawe is provided. If these species have also been planted on Kaho'olawe, sources are listed for all documented accounts of successful establishment. For naturalized species, the first source documenting a naturalized population is provided along with sources for all documented introductions where

such information is available. For cultivated species or species planted for the purpose of land rehabilitation, sources are listed for all documented accounts of successful establishment. The source numbers correspond to the numbered references in the References section of this report.

Some species currently or formerly occurring on Kaho'olawe are considered by the U.S. Fish and Wildlife Service to be extinct or threatened to some degree (34, 35). The following categories are used to describe the endangerment status:

- e Species that are *endangered* to the point that survival is questionable
- c<sub>1</sub> Species that are first priority *candidates* for listing as threatened or endangered based on substantial evidence to support such an action
- c<sub>2</sub> Species that are *candidates* for listing as threatened or endangered, but for which adequate evidence is currently unavailable
- x Species that are believed to be *extinct* throughout the Hawaiian Archipelago
- k This category has been added by the authors of this report to indicate species that have been recorded as living on Kaho'olawe but which are considered to be no longer present.

Whether some reported species have ever occurred on Kaho'olawe is questionable. The following codes are used to identify those species:

- ~ Species reported only from second-hand sources
- ? Species questioned by the Hawai'i Heritage Program due to the absence of properly identified specimens in the Bishop Museum.

	ORIGIN	SOURCE(S)	STATUS
<b>ADIANTACEAE</b>			
<i>Adiantum hispidulum</i> Sw. Rough maidenhair	N	18	
<b>AGAVACEAE</b>			
<i>Agave sisalana</i> Perrine Century plant, sisal, <i>malina</i>	N	17	
<i>Cordylina fruticosa</i> (L.) A. Chev. Ti, <i>ki</i>	C	32	k
<i>Pleomele aurea</i> (H. Mann) N.E. Brown <i>Hala pepe</i> , <i>le'ie</i>	R	28	
<b>AIZOACEAE</b>			
<i>Sesuvium portulacastrum</i> (L.) L. Sea purslane, 'ākulikuli	I/R	16/28	
<b>AMARANTHACEAE</b>			
<i>Amaranthus spinosus</i> L. Spir.y amaranth, <i>pakai kukū</i>	N	16	
<i>Amaranthus viridis</i> L. Slender amaranth, <i>pakai</i> , 'āheahea, <i>pākaiikai</i>	N	16	
<i>Nototrichium sandwicense</i> (A. Gray) Hillebr. <i>Kulu'i</i>	E	37	?
<b>ANACARDIACEAE</b>			
<i>Mangifera indica</i> L. Mango, <i>manakō</i> , <i>manakō meneke</i> , <i>meneke</i>	N	37	k
<b>APIACEAE</b>			
<i>Daucus pusillus</i> Michx. Carrot	C	10	k
<b>APOCYNACEAE</b>			
<i>Catharanthus roseus</i> (L.) G. Don Madagascar periwinkle, <i>kihāpai</i>	N	37	?
<i>Nerium indicum</i> L. Oleander	R	42	

## ARACEAE

<i>Colocasia esculenta</i> (L.) Schott	C	17	-k
Taro, <i>kalo</i>			

## ARALIACEAE

<i>Reynoldsia sandwicensis</i> A. Gray	E	17	-k
'Ohe, 'ohe kukuluae'o, 'ohe makai, 'oheokai			

## ARAUCACEAE

<i>Araucaria heterophylla</i> (Salisb.) Franco	R	45	k
Norfolk Island pine			

## ARECACEAE

<i>Cocos nucifera</i> L.	N	9	
Coconut palm, <i>niu, lolani</i>			

## ASCLEPIADACEAE

<i>Asclepias curassavica</i> L.	N	16	
Butterfly weed, bloodflower, <i>laulele, lauhele, nu'umela, pua 'anuhe</i>			
<i>Asclepias physocarpa</i> (E. Mey.) Schlechter	N	16	
Balloon plant			
<i>Calotropis gigantea</i> (L.) W.T. Aiton	N	14	
Crown flower, <i>puakalaunu</i>			

## ASPLENIACEAE

<i>Asplenium adiantum-nigrum</i> L.	I	18	
-------------------------------------	---	----	--

## ASTERACEAE

<i>Acanthospermum australe</i> (Loefl.) Kuntze	N	17	
Spiny-bur, Paraguay bur, <i>kūkae hipa, 'ihi kūkae hipa, pipili</i>			
<i>Ageratina riparia</i> (Regel) R. King & H. Robinson	N	18	
Spreading mist flower, <i>hāmākua pāmakani</i>			
<i>Ageratum conyzoides</i> L.	N	16	
<i>Maile hohono, maile honohono, maile kula</i>			
<i>Artemisia australis</i> Less.	E/R	37/28	
'Āhinahina, <i>hinahina, hinahina kuahiwi</i>			
<i>Bidens alba</i> (L.) DC var. <i>radiata</i> (Schultz-Bip.) Ballard ex Melchert	N	37	
Spanish needle, beggartick, <i>ko'oko'olau, ko'olau</i>			
<i>Bidens mauiensis</i> (A. Gray) Sherff	E	16	
Spanish needle, beggartick, <i>ko'oko'olau, ko'olau</i>			
<i>Bidens pilosa</i> L.	N	49	
<i>Kī, kī nehe, kī pipili, nehe</i>			

<i>Centaurea melitensis</i> L.	N	14	
Napa thistle, yellow star thistle			
<i>Cirsium vulgare</i> (Savi) Ten.	N	14	
Bull thistle, <i>pua kala</i>			
<i>Conyza bonariensis</i> (L.) Cronq.	N	14	
Hairy horseweed			
<i>Conyza canadensis</i> (L.) Cronq. var. <i>pusilla</i> (Nutt.) Cronq.	N	49	
Horseweed, <i>lani wela</i>			
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	N	18	
-			
<i>Emilia coccinea</i> (Sims) G. Don	N	13	
Flora's paintbrush			
<i>Emilia fosbergii</i> Nicolson	N	14	
-			
<i>Emilia sonchifolia</i> (L.) DC	N	49	
Flora's paintbrush			
<i>Flaveria trinervia</i> (Spreng.) C. Mohr	N	40	
-			
<i>Galinsoga parviflora</i> Cav.	N	16	
-			
<i>Gnaphalium purpureum</i> L.	N	14	
Purple cudweed			
<i>Heterotheca grandiflora</i> Nutt.	N	13	
Telegraph weed			
<i>Hypochoeris glabra</i> L.	N	14	
Smooth cat's ear			
<i>Hypochoeris radicata</i> L.	N	14	
Hairy cat's ear, gosmore			
<i>Lactuca serriola</i> L.	N	18	
Prickly lettuce			
<i>Lipochaeta bryanii</i> Sherff	E	13	x
<i>Nehe</i>			
<i>Lipochaeta connata</i> (Gaud.) DC	E	20	
<i>Nehe</i>			
<i>Lipochaeta integrifolia</i> (Nutt.) A. Gray	E	37	?
<i>Nehe</i>			
<i>Lipochaeta lavarum</i> (Gaud.) DC	E/R	16/28	
<i>Nehe</i>			
<i>Lipochaeta rockii</i> Sherff	E	14	
<i>Nehe</i>			
<i>Lipochaeta succulenta</i> (Hook. & Amott) DC	E	37	?
<i>Nehe</i>			
<i>Montanoa hibiscifolia</i> Benth.	N	18	
Tree daisy			

<i>Pluchea indica</i> (L.) Less.	N	14	
Indian fleabane, Indian pluchea			
<i>Pluchea symphytifolia</i> (Mill.) Gillis	N	16	
Sourbush			
<i>Sigsbeckia orientalis</i> L.	N	16	
Small yellow crown-beard			
<i>Sonchus oleraceus</i> L.	N	27	
Sow thistle, <i>pualele</i>			
<i>Synedrella nodiflora</i> (L.) Gaertn.	N	14	
Nodeweed			
<i>Tridax procumbens</i> L.	N	13	
Coat buttons			
<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.	N	13	
Golden crown-beard			
<i>Vernonia cinerea</i> (L.) Less var. <i>parviflora</i> (Reinw.) DC	N	16	
Lite ironweed			
<i>Xanthium strumarium</i> L. var. <i>canadense</i> (Mill.) Torr. & A. Gray	N	13	
Cocklebur, <i>kikānia</i>			
<i>Zinnia peruviana</i> (L.) L.	N	49	
<i>Pua pihi</i>			
<b>BATACEAE</b>			
<i>Batis maritima</i> L.	N	49	
Pickleweed, 'ākulikuli kai			
<b>BORAGINACEAE</b>			
<i>Cordia subcordata</i> Lam.	R	42,45	k
<i>Kou</i>			
<i>Heliotropium anomalum</i> Hook. & Arnott	I/R	47/28	
<i>Hinahina</i> , <i>hinahina kū kahakai</i> , <i>pōhinahina</i>			
<i>Heliotropium curassavicum</i> L.	I	16	
Seaside heliotrope, <i>kīpūkai</i> , <i>nena</i>			
<i>Tournefortia argentea</i> L. f.	R	42,45	k
Tree heliotrope			
<b>BRASSICACEAE</b>			
<i>Brassica oleracea</i> L. var. <i>capitata</i> L.	C	10	k
Cabbage			
<i>Coronopus didymus</i> (L.) Sm.	N	16	
Swinecress			
<i>Lepidium bidentatum</i> Montin			
var. <i>o-waihiense</i> (Cham & Schlechtend.) Fosb.	I	18	
'Ānaunau, 'ānounou, <i>kūndānā</i> , <i>naunau</i>			
<i>Lepidium oblongum</i> Small	N	14	

<i>Raphanus sativus</i> L.	N	14	
Wild radish			
<i>Sisymbrium altissimum</i> L.	N	14	
Tumble mustard			
<b>BROMELIACEAE</b>			
<i>Ananas cosmosus</i> (L.) Merr.	C	27	k
Pineapple, <i>hala kahiki</i>			
<b>CACTACEAE</b>			
<i>Hylocereus undatus</i> (Haw.) Britton & Rose	N	37	?k
Night-blooming cereus, <i>pāniniokapunahou, pāpipi pua</i>			
<i>Opuntia cochenillifera</i> (L.) Mill.	R	32	k
Cochineal cactus			
<i>Opuntia ficus-indica</i> (L.) Mill.	N	1	
Prickly pear, <i>pānini, pāpipi</i>			
<b>CANNABACEAE</b>			
<i>Cannabis sativa</i> L. subsp. <i>indica</i> (Lam.) E. Small & Cronq.	C	16	k
Marijuana, <i>paka lōlō</i>			
<b>CAPPARACEAE</b>			
<i>Capparis sandwichiana</i> DC	E	17	c <sub>2</sub>
<i>Maiapilo, pilo, pua pilo</i>			
<b>CARICACEAE</b>			
<i>Carica papaya</i> L.	C	10	k
Papaya, <i>mikana, hē'i, milikana, papaia</i>			
<b>CARYOPHYLLACEAE</b>			
<i>Polycarpon tetraphyllum</i> (L.) L.	N	16	
<b>CASUARINACEAE</b>			
<i>Casuarina equisetifolia</i> L.	R	32,42,45	
Common ironwood, <i>paina</i>			
<i>Casuarina glauca</i> Siebold ex Spreng.	R	45	
Longleaf or saltmarsh ironwood			
<i>Casuarina quadrivalvis</i> Labill.	R	22	
Drooping she oak			
<b>CHENOPODIACEAE</b>			
<i>Atriplex canescens</i> (Pursh) Nutt.	R	45	k
Four-wing saltbush			



<i>Atriplex semibaccata</i> R. Br. Australian saltbush	N	19	
<i>Atriplex suberecta</i> Verd. Saltbush	N	18	
<i>Beta vulgaris</i> L. Beet	C	10	k
<i>Chenopodium carinatum</i> R. Br. Goosefoot	N	16	
<i>Chenopodium murale</i> L. Goosefoot, 'āheahea	N	37	
<i>Chenopodium oahuense</i> (Meyen) Aellen 'Āheahea, 'ahea, 'āhewahewa, alaweo, 'āweoweo, kāha'iha'i	R	28	
<i>Salsola kali</i> L. Russian thistle, tumbleweed	N	49	
<b>CLUSIACEAE</b>			
<i>Calophyllum inophyllum</i> L. Alexandrian laurel, kamani, kamanu	R	10,42,45	k
<b>COMBRETACEAE</b>			
<i>Terminalia catappa</i> L. Tropical or Indian almond, false kamani, kamani haole, kamani 'ula	R	42	k
<b>CONVOLVULACEAE</b>			
<i>Bonamia menziesii</i> A. Gray	R	28	
<i>Cressa truxillensis</i> Kunth	I	37	
<i>Ipomea batatas</i> (L.) Lam. Sweet potato, 'uala, 'uwala	C	10,29,46	k
<i>Ipomoea cairica</i> (L.) Sweet Ivy-leaved morning glory, koali 'ai, koali, koali lau manamana, kowali, pa'ali'i	N	17	
<i>Ipomoea indica</i> (J. Burm.) Merr. Koali 'awa, koali 'awahia, koali pehu	I	14	
<i>Ipomoea pes-caprae</i> (L.) R. Br. subsp. <i>brasiliensis</i> (L.) Ooststr. Beach morning glory, pōhuehue, puhuehue	I	17	
<i>Ipomoea tuboides</i> Degener & Ooststr. Hawaiian moon flower	E	16	
<i>Jacquemontia ovalifolia</i> (Choisy) H. Hallier subsp. <i>sandwicensis</i> (A. Gray) K. Robertson Pā'ūohi'iaka, kākuaohi'iaka, kaupō'o	E	13	
<i>Merremia aegyptia</i> (L.) Urb. Hairy merremia, koali kua hulu, kuahulu	N	17	

## CUCURBITACEAE

<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	C	9,10	k
Watermelon, <i>ipu</i> , <i>ipu haole</i>			
<i>Cucumis dipsaceus</i> Ehrenb. ex Spach	N	14	
Hedgehog or teasel gourd			
<i>Cucumis sativus</i> L.	C	16	k
Cucumber			
<i>Cucurbita maxima</i> Duchesne ex Lam.	C	1	k
Pumpkin			
<i>Lagenaria siceraria</i> (Molina) Standl.	C	27	k
Calabash gourd, <i>ipu 'awa'awa</i>			
<i>Momordica charantia</i> L.	N	37	?
Balsam pear			
<i>Sicyos pachycarpus</i> Hook. & Arnott	E	37	
<i>Kūpala</i>			

## CUPRESSACEAE

<i>Cupressus sempervirens</i> L.	R	42	
Mediterranean cypress			

## CYPERACEAE

<i>Carex meyenii</i> Nees	I	37	?
-			
<i>Eleocharis calva</i> Torr.	I	37	
Spikerush, <i>kohekohe</i> , <i>pīpīwai</i>			
<i>Mariscus javanicus</i> (Houtt.) Merr. & Metcalfe	R	28	
' <i>Ahu'awa</i> , ' <i>chu'awa</i>			
<i>Mariscus phleoides</i> Nees ex Kunth subsp. <i>phleoides</i>	E	18	
-			

## DIOSCOREACEAE

<i>Dioscorea</i> sp. L.	N	25	~k
Yam			

## EBENACEAE

<i>Diospyros sandwicensis</i> (A. DC) Fosb.	R	28,45	
<i>Lama</i> , <i>ēlama</i>			

## EPACRIDACEAE

<i>Styphelia tameiameia</i> (Cham. & Schlechtend.) F. v. Muell.	I	17	~k
<i>Pūkiawe</i> , ' <i>a'ali'i mahu</i> , <i>kānehoa</i> , <i>maiele</i> , <i>maieli</i> , <i>puakeawe</i> , <i>puakiawe</i> , <i>pukeawe</i> , <i>pūpūkiawe</i>			

## EUPHORBIACEAE

<i>Aleurites moluccana</i> (L.) Willd. Kukui, kukui	R	10,28	k
<i>Chamaesyce celastroides</i> (Boiss.) Croizat & Degener var. <i>amplectens</i> (Sherff) Degener & I. Degener Spurge, 'akoko, koko, 'ekoko, kōkōmālei	E	14	
var. <i>sokessii</i> (C. Forbes) Degener & I. Degener Spurge, 'akoko, koko, 'ekoko, kōkōmālei	E	37	?
<i>Chamaesyce hirta</i> (L.) Millsp. Hairy or garden spurge, koko kahiki	N	17	
<i>Chamaesyce hypericifolia</i> (L.) Millsp. Graceful spurge	N	49	
<i>Chamaesyce multifornis</i> (Hook. & Arnott) Croizat & Degener var. <i>microphylla</i> (Boiss.) Degener & I. Degener 'Akoko, koko, 'ekoko, kōkōmālei	E	33	?
<i>Chamaesyce prostrata</i> (Aiton) Small Prostrate spurge	N	49	
<i>Chamaesyce skottsbergii</i> (Sherff) Croizat & Degener var. <i>vaccinioides</i> (Sherff) Koutnik 'Akoko, koko, 'ekoko, kōkōmālei	E	37	c <sub>2</sub>
<i>Chamaesyce thymifolia</i> (L.) Millsp. Spurge	N	17	
<i>Euphorbia heterophylla</i> L. Spurge, kaliko	N	37	?
<i>Ricinus communis</i> L. Castor bean, pā'aila, ka'apehā, kamākou, kolī, lā'au 'aila	N	16	

## FABACEAE

Gen. et sp. nov. (new genus)	E	18	
<i>Acacia confusa</i> Merr. Formosa koa	N	42	
<i>Acacia farnesiana</i> (L.) Willd. Klu, aroma, kolū	N	17	
<i>Acacia implexa</i> Benth. Twisted wattle	R	43,45	
<i>Acacia koa</i> A. Gray Koa, koai'a, koai'e, koa 'ohā	R	28,41,42,45	
<i>Acacia mangium</i> Willd. Wattle	R	45	k
<i>Albizia lebbek</i> (L.) Benth. Siris tree, woman's tongue	R	43	k
<i>Cajanus cajan</i> (L.) Millsp. Pigeon pea, pī nūnū, pī Pokoliko	N	19	

<i>Chamaecrista nictitans</i> (L.) Moench			
subsp. <i>patellaris</i> (DC ex Collad.) H. Irwin & Barneby			
var. <i>glabrata</i> (Vogel) H. Irwin & Barneby	N	16	
Partridge pea, <i>lauki</i>			
<i>Crotalaria incana</i> L.	N	14	
Fuzzy rattlepod, <i>kikaehoki</i>			
<i>Desmanthus virgatus</i> (L.) Willd.	N	49	
Slender or virgate mimosa			
<i>Desmodium sandwicense</i> E. Mey.	N	27	
Spanish or chili clover, <i>pua pilipili</i> , <i>kikania pipili</i>			
<i>Desmodium tortuosum</i> (Sw.) DC	N	14	
Florida beggarweed			
<i>Desmodium triflorum</i> (L.) DC	N	17	
Three-flowered beggarweed			
<i>Erythrina sandwicensis</i> Degener	E/R	29/28,41,42,45	
Wiliwili			
<i>Glycine wightii</i> (Wight & Arnott) Verdc.	N/R	14/39,42,45	
Glycine			
<i>Indigofera suffruticosa</i> Mill.	N	49	
Indigo, 'inikō, 'inikoa, kolū			
<i>Leucaena leucocephala</i> (Lam.) de Wit	N	13	
Koa haole, ēkoa, lilikoa			
<i>Macroptilium atropurpureum</i> (DC) Urb.	R	39	
Siratro			
<i>Macroptilium lathyroides</i> (L.) Urb.	N	13	
Wild bean, cow pea			
<i>Mimosa pudica</i> L. var. <i>unijuga</i> (Duchass. & Walp.) Griseb.	N	17	
Sensitive plant, sleeping grass, <i>pua hilahila</i>			
<i>Phaseolus vulgaris</i> L.	C	10	k
String beans			
<i>Pisum sativum</i> L.	C	10	k
Garden peas			
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	N	5	
Algaroba, mesquite, <i>kiawe</i>			
<i>Senna gaudichaudii</i> (Hook. & Arnott) H. Irwin & Barneby	N/R	18/28	
Kolomona, heuhiuhi, kalamona, uhiuhi			
<i>Sesbania grandiflora</i> (L.) Poir.	R	42	k
-			
<i>Sesbania tomentosa</i> Hook. & Arnott	E	16	c <sub>1</sub>
'Ohai			
<i>Sophora chrysophylla</i> (Salisb.) Seem.	E/R	2/10,28	
Māmane, mamani			
<i>Stylosanthes fruticosa</i> (Retz.) Alston	R	45	k
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<i>Stylosanthes humilis</i> Kunth Townsville lucerne	R	45	k
<i>Tephrosia purpurea</i> (L.) Pers. var. <i>purpurea</i> Fish poison, 'auhuhu, ahuhu, 'auhola, hola	N/R	16/45	
<i>Tephrosia vogelii</i> Hook. f. Fish poison tree	R	45	k
<i>Vigna o-wahuensis</i> Vogel	E	37	c <sub>1</sub>
<b>GENTIANACEAE</b>			
<i>Centaurium erythraea</i> Raf. subsp. <i>erythraea</i> Bitter herb, European centaury	N	14	
<b>GOODENIACEAE</b>			
<i>Scaevola coriacea</i> Nutt. Dwarf naupaka	R	28,45	e
<i>Scaevola sericea</i> Vahl Beach naupaka, <i>naupaka kahakai</i> , <i>huahekili</i> , <i>naupaka kai</i>	I/R	47/42,45	
<b>HEMIONITIDACEAE</b>			
<i>Ptyrogramma calomelanos</i> (L.) Link Goldfern	N	18	
<b>HERNANDIACEAE</b>			
<i>Gyrocarpus americanus</i> Jacq. American gyrocarp	R	42	k
<b>LAMIACEAE</b>			
<i>Ocimum gratissimum</i> L. Basil	N	18	
<b>LILIACEAE</b>			
<i>Aloe vera</i> L. Aloe	C	40	
<b>MALVACEAE</b>			
<i>Abutilon grandifolium</i> (Willd.) Sweet Hairy abutilon, <i>ma'o</i>	N	14	
<i>Abutilon incanum</i> (Link) Sweet Hoary abutilon, <i>ma'o</i>	I	17	
<i>Abutilon menziesii</i> Seem. <i>Ko'oloa 'ula</i>	R	28,41	e
<i>Gossypium tomentosum</i> Nutt. ex Seem. Hawaiian cotton, <i>ma'o</i> , <i>huluhulu</i>	E/C/R	17/10/28,41,45	

<i>Hibiscus brackenridgei</i> A. Gray	E/R	37/28	c <sub>1</sub>
Ma'o hau hele			
<i>Hibiscus tiliaceus</i> L.	R	28	
Hau			
<i>Malva parviflora</i> L.	N	16	
Cheese weed			
<i>Malvastrum coromandelianum</i> (L.) Garcke subsp. <i>coromandelianum</i>	N	16	
False mallow			
<i>Sida fallax</i> Walp.	I	13	
'Ilima			
<i>Sida rhombifolia</i> L.	N	37	
-			
<i>Sida spinosa</i> L.	N	18	
Prickly sida			
<i>Thespesia populnea</i> (L.) Sol. ex Corrêa	R	28,42,45	
Portia tree, <i>milo</i>			
<b>MELIACEAE</b>			
<i>Melia azedarach</i> L.	R	42	k
Chinaberry, Pride-of-India, 'Inia, 'ilinia			
<b>MORACEAE</b>			
<i>Broussonetia papyrifera</i> (L.) Venten.	N/C	37/10	
Paper mulberry, <i>wauke</i> , <i>po'a'aha</i>			
<i>Ficus microcarpa</i> L. fil.	N	40	
Chinese or Malayan banyan			
<b>MUSACEAE</b>			
<i>Musa</i> sp. L.	C	17	~k
Banana, <i>mai'a</i>			
<b>MYOPORACEAE</b>			
<i>Myoporum sandwicense</i> A. Gray	I/R	18/28,45	
Bastard sandalwood, <i>naio</i> , <i>naeo</i> , <i>naieo</i>			
<b>MYRTACEAE</b>			
<i>Eucalyptus camaldulensis</i> Dehnh.	R	42,43,45	
Red river gum, Murray red gum			
<i>Eucalyptus citriodora</i> Hook.	R	42	
Lemon-scented gum			
<i>Eucalyptus globulus</i> Labill.	R	42	k
Blue gum			
<i>Eucalyptus punctata</i> DC	R	45	
Grey gum			

<i>Eucalyptus robusta</i> Sm. Swamp mahogany	R	42	k
<i>Eucalyptus sideroxylon</i> A. Cunn. ex Woolls Red ironbark, mugga	R	42,45	
<i>Eucalyptus tereticornis</i> Sm. Forest red gum	R	42	k
<i>Eucalyptus torrelliana</i> F. Muell. Cadaga	R	45	k
<i>Metrosideros polymorpha</i> Gaud. 'Ōhi'a, 'ōhi'a lehua, lehua	R	10	k
<i>Psidium guajava</i> L. Guava, kuawa, kuawa ke'oke'o, kuawa lemi, kuawa momona, puawa	N	32	k
<i>Syzygium malaccense</i> (L.) Merr. & Perry Mountain or Malay apple, 'ōhi'a 'ai, 'ōhi'a, 'ōhi'a 'ai ke'oke'o, 'ōhi'a hākea, 'ōhi'a kea, 'ōhi'a leo, 'ōhi'a 'ula	R	10	k
<b>NEPHROLEPIDACEAE</b>			
<i>Nephrolepis multiflora</i> (Roxb.) Jarrett ex Morton Kupukupu, ni'ani'au	N	14	
<b>NYCTAGINACEAE</b>			
<i>Boerhavia coccinea</i> Mill.	N	37	
<i>Boerhavia glabrata</i> Blume Alena, nena	I	37	?
<i>Boerhavia herbstii</i> Fosb. Alena	E	14	
<i>Boerhavia repens</i> L. Alena, nena	I	37	
<b>OLEACEAE</b>			
<i>Noronia emarginata</i> (Lam.) Thouars ex Hook. Madagascar olive	R	42	k
<b>OPHIOGLOSSACEAE</b>			
<i>Ophioglossum concinnum</i> Brack. Pololei	E	18	c <sub>1</sub>
<b>OXALIDACEAE</b>			
<i>Oxalis corniculata</i> L. Yellow wood sorrel, 'ihi 'ai, 'ihi 'awa, 'ihi maka 'ula, 'ihi mākole	N	16	

## PANDANACEAE

- Pandanus tectorius* S. Parkinson ex Z R 42,45 k  
Screwpine, *hala*, *pū hala*

## PAPAVERACEAE

- Argemone glauca* (Nutt. ex Prain) Pope var. *glauca* E/R 13/28  
Prickly poppy, *pua kala*, *kala*, *naule*, *pōkalakala*  
*Argemone mexicana* L. N 17  
Mexican poppy

## PHYTOLACCACEAE

- Phytolacca dioica* L. R 44,45 k  
'Ombu

## PINACEAE

- Callitris columellaris* F. Muell. R 42 k  
Murray River pine  
*Callitris endlicheri* (Parlot.) F.M. Bailey R 42 k  
Black cypress pine  
*Pinus brutia* Ten. R 42,45 k  
Brutia pine  
*Pinus halapensis* Mill. R 43 k

## PLUMBAGINACEAE

- Plumbago zeylanica* L. I/R 37/45 k  
Leadwort, 'ilie'e, hilie'e, 'ilihe'e

## POACEAE

- Bothriochloa ischaemum* (L.) Keng R 39  
Yellow bluestem  
*Bothriochloa pertusa* (L.) A. Camus N 49  
Pitted beardgrass  
*Buchloë dactyloides* (Nutt.) Engelm. R 39  
Buffalograss  
*Cenchrus ciliaris* L. N/R 16/39,42,45  
Buffelgrass  
*Cenchrus echinatus* L. N 27  
Common sandbur, 'ume'alu, mau'u kukū  
*Cenchrus tribuloides* L. N 18  
Dune sandbur  
*Chloris barbata* (L.) Sw. N 13  
Swollen fingergrass, mau'u lei



<i>Chloris divaricata</i> R. Br. var. <i>divaricata</i> Stargrass	N	14	
<i>Chloris truncata</i> R. Br. Stargrass	R	14	
<i>Chloris virgata</i> Sw. Feather fingergrass	N	49	
<i>Chrysopogon aciculatus</i> (Retz.) Trin. Golden beardgrass, <i>mānienie 'ula, pi'ipi'i, pilipili 'ula</i>	I	2	
<i>Cynodon dactylon</i> (L.) Pers. Common bermudagrass, <i>mānienie, mānienie haole</i>	N/R	17/39,42,45	
<i>Cynodon plectostachyus</i> (K. Schum.) Pilg. Starrgrass	R	42,45	
<i>Dactyloctenium aegyptium</i> (L.) Willd. Beach wiregrass	N	49	
<i>Dichanthium aristatum</i> (Poir.) Hubb. Wilder grass	N	49	
<i>Dichanthium sericeum</i> (R. Br.) A. Camus Australian bluestem	N	37	
<i>Digitaria ciliaris</i> (Retz.) Koeler Henry's crabgrass, <i>kūkaepua'a</i>	N	16	
<i>Digitaria eriantha</i> Steud. Fingergrass	R	45	
<i>Digitaria insularis</i> (L.) Mez ex Ekman Sourgrass	N	16	
<i>Digitaria pentzii</i> Stent Pangola grass	N/R	37/42,45	
<i>Echinochloa colona</i> (L.) Link Jungle-rice	N	14	
<i>Ehrharta calycina</i> Sm. Perennial veldtgrass	R	45	k
<i>Eleusine indica</i> (L.) Gaertn. Goosegrass, wiregrass, <i>mānienie ali'i</i>	N	14	
<i>Eragrostis atropioides</i> Hillebr. Lovegrass	E	14	
<i>Eragrostis cilianensis</i> (All.) Link Stinkgrass	N	16	
<i>Eragrostis curvula</i> (Schrad.) Nees Weeping lovegrass	R	39,45	
<i>Eragrostis supurba</i> Peyritsch Lovegrass	R	45	
<i>Eragrostis tenella</i> (L.) P. Beauv. ex Roem. & Schult. Japanese lovegrass, <i>hākonakona</i>	N	14	
<i>Eragrostis variabilis</i> (Gaud.) Steud. <i>Kāwelū, 'emoloa, kalamālō</i>	E/R	26/28	

<i>Heteropogon contortus</i> (L.) P. Beauv. ex Roem. & Schult. Twisted beardgrass, tanglehead, <i>pili</i> grass, <i>pili</i> , <i>lule</i>	I/R	2/10,42,45	
<i>Ischaemum byrone</i> (Trin.) Hitchc. Hilo ischaemum	R	28	c <sub>1</sub> ,k
<i>Leptochloa uninervia</i> (K. Presl) Hitchc. & Chase Sprangletop	N	40	
<i>Lolium multiflorum</i> Lam. Italian ryegrass	R	39	
<i>Melinis minutiflora</i> P. Beauv. Molasses grass	N	32	
<i>Panicum fauriei</i> Hitchc. var. <i>fauriei</i>	E	14	
Panic grass			
var. <i>latius</i> (St.John) Davidse	E	14	
Panic grass			
<i>Panicum maximum</i> Jacq. Guinea grass, green panicgrass	N/R	13/39,42,45	
<i>Panicum ramosius</i> Hitchc. Panic grass	E	37	
<i>Panicum torridum</i> Gaud. Torrid panicgrass, <i>kākonakona</i>	E	49	
<i>Panicum xerophilum</i> (Hillebr.) Hitchc. <i>Kākonakona</i>	E	31	
<i>Paspalum dilatatum</i> Poir. Dallis grass	N	22	
<i>Pennisetum polystachion</i> (L.) Schult. Feathery pennisetum	N	16	?
<i>Rhynchelytrum repens</i> (Willd.) Hubb. Natal redtop, Natal grass	N/R	16/10	
<i>Saccharum officinarum</i> L. Sugar cane, <i>ko'ula</i>	C	1,27	k
<i>Setaria gracilis</i> Kunth Yellow or perennial foxtail, <i>mau'u Kaleponi</i>	N	18	
<i>Setaria leucopila</i> (Scribn. & Merr.) K. Schum. Plains bristlegrass	R	39	
<i>Setaria verticillata</i> (L.) P. Beauv. Bristly foxtail, <i>mau'u pilipili</i>	N	49	
<i>Sporobolus indicus</i> (L.) R. Br. West Indian dropseed, smutgrass	N	38	
<i>Sporobolus virginicus</i> (L.) Kunth Seashore rushgrass, beach dropseed, <i>'aki'aki</i> , <i>'aki</i> , <i>mahiki</i> , <i>māhikihiki</i> , <i>mānienie</i> , <i>mānienie 'aki'aki</i> , <i>mānienie māhikihiki</i> , <i>mānienie maoli</i>	I/R	13/28	

<i>Tragus berteronianus</i> Schult. Burggrass, bertero goatgrass	N	16	
<b>POLYGONACEAE</b>			
<i>Coccoloba uvifera</i> (L.) L. Sea grape	R	42,45	k
<b>POLYPODIACEAE</b>			
<i>Phymatosorus scolopendria</i> (N.L. Burm.) Pic.-Ser. <i>Laua'e</i>	N	18	
<b>PORTULACACEAE</b>			
<i>Portulaca lutea</i> Sol. ex G. Forster Purslane, 'ihi	I	17	?
<i>Portulaca molokiniensis</i> Hobby Purslane, 'ihi	E	37	c <sub>2</sub>
<i>Portulaca oleracea</i> L. Pigweed, 'ākulikuli kula, 'ākulikuli lau li'i, 'ihi	N	16	
<i>Portulaca pilosa</i> L.	N	18	
<i>Portulaca sclerocarpa</i> A. Gray <i>Po'e</i> , 'ihi, ihi mākole	E	20	c <sub>1</sub>
<i>Portulaca villosa</i> Cham. Purslane, 'ihi	E	37	c <sub>2</sub>
<b>PRIMULACEAE</b>			
<i>Anagallis arvensis</i> L. Scarlet pimpernel, poor man's weatherglass	N	37	
<b>PROTEACEAE</b>			
<i>Grevillea robusta</i> A. Cunn. ex R. Br. Silk, silver or he oak, 'oka kilika, ha'ikū ke'oke'o	R	26	k
<b>RHAMNACEAE</b>			
<i>Alphitonia ponderosa</i> Hillebr. <i>Kauila</i> , <i>kauwila</i>	R	28	
<i>Colubrina asiatica</i> (L.) Brongn. 'Ānapanapa, <i>kauila</i> 'ānapanapa, <i>kauila kukuku</i> , <i>kukuku</i>	R	28	
<i>Gouania hillebrandii</i> Oliver	E	37	e,k
<b>RHIZOPHORACEAE</b>			
<i>Rhizophora mangle</i> L. American or red mangrove	N	16	

## ROSACEAE

- Osteomeles anthyllifolia* (Sm.) Lindl. R 28,41  
'Ūlei, u'ulei

## RUBIACEAE

- Canthium odoratum* (G. Forster) Seem. R 28  
Alahe'e, 'ōhe'e, walahe'e
- Coffea arabica* L. C 10,27  
Arabian coffee
- Morinda citrifolia* L. R 28  
Indian mulberry, noni

## SANTALACEAE

- Exocarpos gaudichaudii* A. DC E 37 ?c<sub>2</sub>  
Hulumoa, kaumahana
- Santalum ellipticum* Gaud. E/R 32/28  
Coast sandalwood, 'iliahialo'e
- Santalum paniculatum* Hook. & Arnott E 20  
Sandalwood, 'iliahi

## SAPINDACEAE

- Dodonea viscosa* Jacq. I/R 27/28,41,45  
'A'ali'i, 'a'ali'i kū makani, 'a'ali'i kū ma kua, kūmakani

## SINOPTERIDACEAE

- Doryopteris decipiens* (Hook.) J. Sm. E 17  
Kumuniu
- Doryopteris decora* Brack. E 16 ?  
Desert doryopteris, 'iwa'iwa

## SOLANACEAE

- Lycium sandwicense* A. Gray I 17  
'Ōhelo kai, 'ae'ae, 'ākulikuli 'ae'ae, 'ākulikuli kai,  
'ākulikuli 'ōhelo
- Lycopersicon esculentum* Mill. N 14  
Tomato, 'ōhi'a lomi, kamako, 'ōhi'a, 'ōhi'a haole
- Lycopersicon pimpinellifolium* (Jusl.) Mill. N 49  
Currant tomato, 'ōhi'a ma ka nahele
- Nicotiana glauca* R.C. Graham N 17  
Tree tobacco, mustard tree, mākāhala, paka
- Nicotiana tabacum* L. C 27 k  
Tobacco, paka
- Solanum americanum* Mill. I 49  
Glossy nightshade, pōpolo, 'olohua, polopolo

<i>Solanum linnaeanum</i> Hepper & P. Jaeger	N	14	
Apple of Sodom, thorny or yellow-fruited <i>popolo</i> , <i>pōpolo kikānia</i>			
<i>Solanum melongena</i> L.	C	10	k
Eggplant			
<i>Solanum tuberosum</i> L.	C	1,10	k
Potato, 'uala <i>kahiki</i>			
<b>STERCULIACEAE</b>			
<i>Waltheria indica</i> L.	I	17	
'Uhaloa, 'ala'ala pū loa, hala 'uhaloa, hi'aloa, kanakaloo			
<b>TAMARICACEAE</b>			
<i>Tamarix aphylla</i> (L.) H. Karst.	R	42,45	
Tamarisk			
<b>THELYPTERIDACEAE</b>			
<i>Christella dentata</i> (Forsk.) Browney & Jermy	I	14	
Oak fern			
<i>Christella parasitica</i> (L.) Levl.	N	18	
<b>THYMELAEACEAE</b>			
<i>Wikstroemia</i> sp. Endl.	E	2	
'Ākia, kauhi			
<b>URTICACEAE</b>			
<i>Neraudia sericea</i> Gaud.	E	20	c <sub>1</sub> ,k
-			
<i>Touchardia latifolia</i> Gaud.	C	10	k
Olonā			
<b>VERBENACEAE</b>			
<i>Lantana camara</i> L.	N	17	
Lākana, lā'au kalakala, mikinolia hihiu, mikinolia hohono, mikinolia kukū			
<i>Stachytarpheta dichotoma</i> (Ruiz & Pav.) Vahl	N	49	
'Ōwī, oī			
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	N	37	
Jamaica vervain, ōwī, oī			
<i>Verbena litoralis</i> Kunth	N	14	
Vervain, ōwī, oī			

ZYGOPHYLLACEAE

*Tribulus cistoides* L.

I

17

Caltrop, *nohu*, *nohunohu*

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