

Resolving the Identity and Natural Occurrence of the Enigmatic Balayong (*Cassia* L., Fabaceae) of Palawan, Philippines

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ABSTRACT

Cassia is a genus of leguminous trees that bear attractive colorful flowers with tropical distribution. The pink-to-white-flowered trees are commonly cultivated and are considered as exotic to the Philippines. *Balayong* is a local botanical name that broadly refers to *Cassia* trees in Palawan and became the flagship species of Puerto Princesa City, the capital of Palawan, because of its floral blooms and the trees symbolize feisty femininity and beauty. It is annually celebrated as a festival, namely, the Balayong Festival. However, several scientific names for *balayong* have been claimed as the correct name as well as their unending presumptions of origin. This study aimed to resolve the identity and botanical indigeneity of the *balayong* (*Cassia*) of Palawan. A review of the literature, examination of actual and digital images of herbarium specimens, fieldwork, and analysis of nomenclature were conducted. Three taxa of the pink-to-white-flowered *Cassia*, namely, *Cassia grandis*, *C. javanica* subsp. *javanica*, and *C. javanica* subsp. *nodosa*, and the yellow-flowered *C. fistula* are recognized to occur in Palawan. Among these, *C. javanica* subsp. *javanica* is indigenous to the Philippines, with historical records of collections from Palawan. A key to the identification of the species, literature citations, brief description, and taxonomic notes are presented to delineate the different kinds of *Cassia* in Palawan.

Keywords: legumes, biodiversity conservation, indigenous species, flagship species, Palawan biodiversity

INTRODUCTION

Cassia is a leguminous genus of trees and large shrubs widely distributed in low-altitude forests in tropical and subtropical America, Africa, Asia, Malesia, and Australia (Larsen & Hou, 1996; Plants of the World Online [POWO], 2023). Most of the *Cassia* tree species bear large, showy, and complex flowers and are spectacular when they are in full bloom making *Cassia*

species favored for cultivation as an ornamental to beautify roads, parks, and gardens around the world (Larsen & Hou, 1996). To date, there are 1,132 names recorded for *Cassia* worldwide (Roskov et al., 2023). In this list, there are three recorded species for the Philippines, namely, *Cassia fistula* L., *C. grandis* L.f., and *C. javanica* L., with three subspecies, namely, *C. javanica* subsp. *javanica*, *C. javanica* subsp. *nodosa* (Buch.-Ham. ex

Roxb.) K.Larsen & S.S.Larsen, and *C. javanica* subsp. *pubiflora* (Merr.) K.Larsen. Among these species, only *C. javanica* subsp. *javanica* and *C. javanica* subsp. *pubiflora* are known to be native to the Philippines, the latter being endemic to Luzon (Pelser et al., 2011; POWO, 2023; Roskov et al., 2023).

A collection of *Cassia* plant materials obtained from Ilocos Sur and Rizal was originally named *Cassia javanica* var. *pubifolia* by Merrill (1910). This variety name was recognized by succeeding taxonomists such as Merrill (1923), de Wit (1956), and Irwin and Barneby (1982). However, when Larsen (1993) raised this taxon to the subspecies level, he overlooked the spelling and named it *C. javanica* subsp. *pubiflora*. This apparent taxonomic mistake has never been corrected up to the present, despite Larsen (1993) and Larsen and Hou (1996) mentioning the aforementioned authors as references for the taxon in the monograph of *Cassia*. This paper herein recognizes *C. javanica* subsp. *pubifolia*.

There is a current confusion on the taxonomic identity of the *Cassia* species in the Philippines, in general, but it is more felt in Palawan, which was brought about by belief in the local knowledge that there are several varieties of the plants on the island, but their distinctness is not so apparent from the flower color and the pod characters. Regardless of these variations, all of the pink and white *Cassia* trees in Palawan are thought to belong to just one variety collectively called *balayong*. These trees share the same characteristics of being fully or partly deciduous, that is, totally or partially shedding their leaves during the summer months (February to May). These trees bear clusters of small to large pink to white flowers that persist on

the branches leading the trees to be oftentimes called Palawan cherry, but the appropriateness of the English name is questioned as this is not the true cherry blossom (*Prunus* sp.), which is indigenous to Japan and Korea. The local government of Puerto Princesa City adopted the name *balayong*, which is the local *Cuyunon* name for Palawan cherry. The species has become the flagship species of the city and is officially celebrated annually as a festival (Balayong Festival) in accordance with City Ordinance No. 288, which passed on October 28, 2005.

Nevertheless, there still arises the problem of the true identity or the correct scientific names of the *Cassia* trees locally called *balayong* in Palawan. Several scientific names, specifically *C. javanica*, *C. javanica* subsp. *javanica*, *C. nodosa*, *C. javanica* subsp. *nodosa*, and *Cassia* x Palawan cherry, are claimed by botanists as the correct names for these enigmatic trees, but there is still no agreement on which name to adopt (Ecosystems Research and Development Bureau [ERDB], 2013; Madulid, 2000). The prevailing confusion is very unsettling for the local authorities and people of Palawan who are clamoring for the final settlement of this nomenclatural issue based on the authors' observation. This paper analyzed the available data and scientific and historical information and arrived at a taxonomic decision on the *Cassia* species found in Palawan.

MATERIALS AND METHODS

Field surveys and observation of *Cassia* species, with special attention to the occurrence of the taxa, were conducted in forests and settled areas, including parks and roadsides, in Palawan. A

morphological examination of field-collected specimens was also conducted. Important external features such as flower, pod, and seed characters were used to investigate the range of variation within the taxa and to determine the diagnostic characters for each taxon. Available herbarium specimens of *Cassia* in the De La Salle University Herbarium (DLSUH), University of the Philippines Los Baños Herbarium (CAHUP), and Philippine National Herbarium (PNH) and digital images of herbarium specimens deposited from the United States National Herbarium (US) were also accessed and examined. Herbarium acronyms follow Thiers (2023).

Important notes by the collectors on the herbarium specimen sheets and historical and modern botanical literature on the genus as well as on Palawan were also studied to analyze routes of expeditions of botanists and ecologists, to describe the forest conditions during the period of collection, and to note possible encounters of *Cassia*. Online plant databases, namely, the International Legume Database and Information Service (ILDIS), POWO, World Flora Online (WFO), and Co's Digital Flora of the Philippines, were utilized to search for the updated

nomenclature and possible occurrences of the species. The geographical distribution of each taxon, specifically the non-native distribution, was presented based on the World Geographical Scheme for Recording Plant Distributions (WGSRPD) format (Brummitt, 2001). The conservation status of native *Cassia* species in Palawan was assessed and proposed following the International Union for Conservation of Nature (IUCN) Red List Categories and Criteria version 3.1 (Second Edition; IUCN, 2012).

RESULTS AND DISCUSSION

TAXONOMY

There are three species and three subspecies of *Cassia* recorded in the Philippines, namely, *Cassia fistula*, *C. grandis*, *C. javanica*, *C. javanica* subsp. *javanica*, *C. javanica* subsp. *nodosa*, and *C. javanica* subsp. *pubifolia*. Among these species, *C. fistula*, *C. grandis*, *C. javanica* subsp. *javanica*, and *C. javanica* subsp. *nodosa* occur in the Palawan biogeographic region, but only *C. javanica* subsp. *javanica* is found to naturally thrive in the region.

Artificial Key to the Identification of *Cassia* in Palawan

- 1 Flowers yellow.....*Cassia fistula*
- 1 Flowers pink to white.....2
- 2 Petals less than 1 mm long, rounded or orbicular; leaves, calyx, style and anthers hairy; pods somewhat compressed, rugose*Cassia grandis*
- 2 Petals greater than 1 mm long, elliptic to obovate; leaves, calyx, style and anthers not hairy; pods cylindrical, not rugose.....3
- 3 Sepals green with a red to pink tinge from bud to maturity; pods segmented; seeds disc-like or round..... *Cassia javanica* subsp. *javanica*
- 3 Sepals persistent red from bud to maturity; pods not segmented; seeds elliptic.....*Cassia javanica* subsp. *nodosa*

TAXONOMIC TREATMENT

1. *Cassia fistula* L.

Cassia fistula L., Sp. Pl. (1753) 377; Blanco, Fl. Filip. (1837) 339, ed. 2 (1845) 237, ed. 3, 2 (1878) 76; F.-Vill., Novis. App. (1880) 70; Vidal, Sinopsis Atlas (1883) 24, Phan. Cuming. Philip. (1885) 110, Rev. Pl. Vasc. Filip. (1886) 116; Merr., Philipp. J. Sci. Bot. 5 (1910) 47, Sp. Blancoanae (1918) 174, En. Philip. Fl. Pl. 2 (1923) 262; Brown, Useful Pl. Philipp. 2 (1941) 102, f. 42: 103; de Wit, Webbia 11 (1956) 207; Quisumbing, Med. Pl. Philipp. (1978) 379; Irwin & Barneby, Mem. N.Y. Bot. Gard. 35 (1982) 14; Pancho, Kalikasan, Philipp. J. Biol., Suppl. 1 (1983) 440; Larsen & Ding Hou, Fl. Mal. 12 (1996) 557, f. 558; Luckow, Baileya 23 (1996) 204; Madulid, Cycl. Philipp. Orn. Pl. (2021) 393, f. 394.

Common/Local Names: golden raintree, golden shower, golden tropical shower, Indian laburnum, purging cassia, tropical golden shower (Eng), antsoan-dilaw (Tag), balayong (BisPn), barayong (Myn), barayun (Han), bitsula (BisC), caña fistula (Sp), fistula (BisC), harayan (Han), ibabaw, ibubaw (Bis), lapad-lapad (Tbl), lombayong (Bis), pistula (BisC) (Madulid, 2001).

Diagnosis: This is a semi-deciduous tree that reaches a height of 20 m. Leaves are 30–50 cm long. Leaflets are ovate. Flowers are yellow with calyx less than 1 cm long and petals to 5 cm long. Fruits are cylindric and smooth. Seeds are yellowish brown and elliptic.

Taxonomic Notes: The species is easily distinguished from all the other *Cassia* taxa with its showy yellow flowers. This species was misidentified by Blanco (1837)

as *C. javanica* and corrected by Merrill (1918) as *C. fistula*.

Distribution: Native to Assam, Bangladesh, East Himalaya, India, Myanmar, Nepal, Sri Lanka, West Himalaya (POWO, 2023).

Introduced into Northern America: Mexico Southwest; Southern America: Southwest Caribbean, El Salvador, Nicaragua, Panamá, Colombia, Ecuador, Peru, Venezuela, Trinidad-Tobago, Guyana, French Guiana; Africa: Cape Verde, Senegal, Gambia, Gulf of Guinea Is., Cameroon, Zaire, Angola, Egypt, Ethiopia, Uganda, Kenya, Tanzania, Malawi, Zimbabwe, Comoros; Asia-Temperate: Iraq, Yemen, China Southeast; Asia-Tropical: Pakistan, Laccadive Is., Maldives, Andaman Is., Malaya, Sumatera, Borneo, Jawa, Sulawesi, Lesser Sunda Is., Maluku, Philippines, New Guinea; Australasia: Western Australia, Northern Territory, Queensland; Pacific: Caroline Is., Society Is., Vanuatu, Marianas (POWO, 2023).

It is widely propagated in the Philippines, including Palawan.

Uses: The pulp of the fruit is sweet and sticky and used as medicine for various ailments. The bark of the tree is used for tanning and as a betel paste ingredient. Root decoction is used for wound cleaning. Ornamental (de Wit, 1956; Larsen & Hou, 1996; Madulid, 2021).

Specimens studied: Agoo *s.n.* [DLSUH 6341!], Palawan, Puerto Princesa City.

Other specimens studied: Domingo *SJC23001* [DLSUH 6345!], Luzon, National Capital Region, San Juan City, in front of Kabayanan Elementary School,

'cultivated'; *Espiritu 37* [CAHUP 7045!], Luzon, Laguna, Los Baños, College Campus; *Curio s.n.* [CAHUP 10079!], Luzon, Laguna, Los Baños, College Campus; *Paysan s.n.* [CAHUP 3376!], Luzon, Laguna, Los Baños, College Campus; *Orlido s.n.* [CAHUP 10655!], Luzon, Laguna, Los Baños, side of U.P. Library; *Novero 2B* [CAHUP 52190!, CAHUP 52191!], Luzon, Laguna, Los Baños, UPLB College; *Pancho s.n.* [CAHUP 20125!, CAHUP 20319!], Luzon, Laguna, Los Baños, College Campus, 'cultivated'; *Pancho 568* [CAHUP 3375!], Luzon, Laguna, Los Baños, College Campus; *Ramirez s.n.* [CAHUP 27026!], Luzon, Laguna, Los Baños, UPLB, near Old Library Bldg.; *Bravo 1* [CAHUP 62707!, CAHUP 62708!], Mindanao, Cotabato, Kabacan, USM; *Rocero 12* [PNH 165086!], Cagayan, Tuguegarao, Ugac Norte, school garden; *Sulit 1527* [PNH 8344!], Luzon, Laguna, Makiling National Park, below Faculty Hill, College Campus, 'planted'.

2. *Cassia grandis* L.f. —Fig. 1

Cassia grandis L.f., Suppl. (1781) 230; de Wit, *Webbia* 11 (1956) 212; Irwin & Barneby, *Mem. N.Y. Bot. Gard.* 35 (1982) 30; Larsen & Ding Hou, *Fl. Mal.* 12 (1996) 559; Luckow, *Baileya* 23 (1996) 204; Madulid, *Cycl. Philipp. Orn. Pl.* (2021) 394, f. 394.

Common/Local Names: apiang tree, grand shower, Palawan cherry, pink shower (Eng) (Madulid, 2001).

Diagnosis: The species is a semi-deciduous tree reaching a height of 20 m. The leaflets are oblong, rounded at the base and at the tip. The flowers are borne of leafless branches. The petals are light

pink, only about 1 cm long, and round in shape. The style and anthers are hairy. The pods are about 60 cm long and 3 cm broad, somewhat compressed but thick, rough textured, with a thick-lipped groove on the margin. The seeds are chestnut brown in color and elliptic in shape.

Taxonomic Notes: The leaflets of *C. grandis* are similar to those of *C. javanica* subsp. *renigera* (from Burma). But the flowers are distinctly smaller and pink and not turning white, and with hairy style and anthers.

Distribution: Native to Belize, Bolivia, Brazil North, Brazil Northeast, Brazil West-Central, Brazil Southeast, Brazil South, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico Central, Mexico Gulf, Mexico Southwest, Mexico Southeast, Nicaragua, Panamá, Peru, Puerto Rico, Southwest Caribbean, Suriname, Venezuela (POWO, 2023).

Introduced into Southern America: Galápagos, Trinidad-Tobago; Africa: Gambia, Sierra Leone, Ivory Coast, Zaïre, Uganda, Tanzania; Asia-Tropical: India, Sri Lanka, East Himalaya, Bangladesh, Myanmar, Thailand, Laos, Vietnam, Cambodia, Jawa, New Guinea; Australasia: Queensland; Pacific: Caroline Is. (POWO, 2023).

It is introduced and cultivated in the Philippines, including Palawan.

Uses: The pulp of the fruit is somewhat sweet and sticky, and it is used as medicine for various ailments, similar to *C. fistula*. The wood is durable and used for various

construction purposes. Ornamental (Larsen & Hou, 1996; Madulid, 2021).

Specimens studied: Agoo *s.n.* [DLSUH 6342!], Palawan, Puerto Princesa City, Sicsican.

Other Specimens Studied: *Payawal et al. s.n.* [CAHUP 25458!], Luzon, Laguna,

Los Baños, UPLB, Old Library; *Raagas s.n.* [PNH 108757!], Panay Island, Capiz, Maayon, 'planted along the road'; *Payawal s.n.* [PNH 91921!], Luzon, Manila, in the garden, 'introduced'. *Quisumbing s.n.* [PNH 91922!], Manila, garden, 'introduced'; *Manzo & Icaro s.n.* [PNH 79650!], Mindanao, Zamboanga.

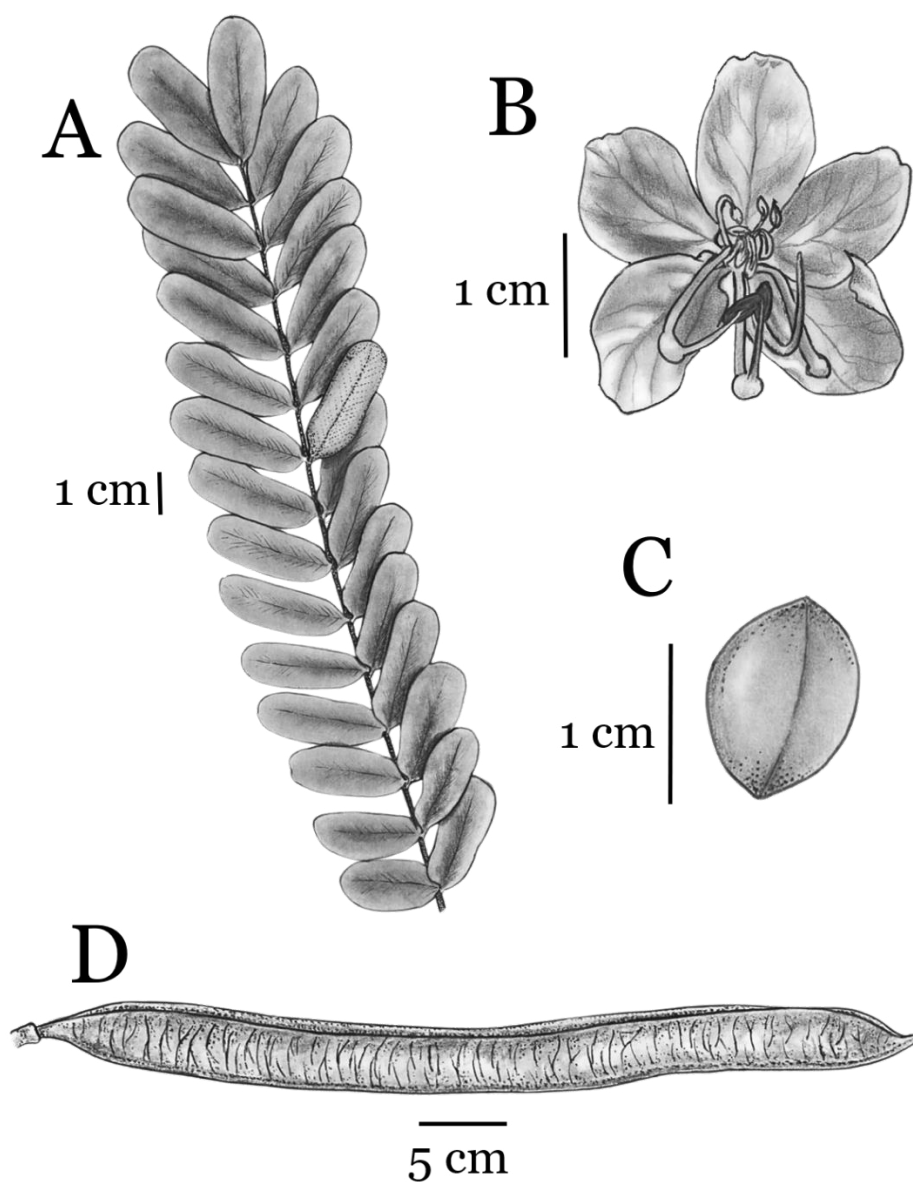


Figure 1. *Cassia grandis*. A. leaf; B. flower; C. seed; D. pod.

3. *Cassia javanica* L.

Cassia javanica L., Sp. Pl. (1753) 379; F.-Vill., Novis. App. (1880) 70; Vidal, Sinopsis Atlas (1883) 24, Rev. Pl. Vasc. Filip. (1886) 116; Perk., Frag. Fl. Philip. (1904) 14; Merr., Philipp. J. Sci. Bot. 5 (1910) 48, En. Philip. Fl. Pl. 2 (1923) 263; de Wit, Webbia 11 (1956) 214; Irwin & Barneby, Mem. N.Y. Bot. Gard. 35 (1982) 46; Pancho, Kalikasan, Philipp. J. Biol., Suppl. 1 (1983) 440; Larsen & Ding Hou, Fl. Mal. 12 (1996) 560; Luckow, Baileyana 23 (1996) 205.

Cassia javanica L. subsp. *javanica* L. — Figs. 2–8

Cassia javanica subsp. *javanica* K.&S.S.Larsen in Fl. Camb., Laos & Vietnam 18 (1980) 84, pl. 14/7; Larsen, K. & S.S. Larsen, Fl. Thailand 4 (1984) 107, g. 26/7; Larsen & Ding Hou, Fl. Mal. 12 (1996) 561, f. 22: 562; Madulid, Cycl. Philipp. Orn. Pl. (2021) 395, f. 395.

Synonyms:

Cassia fistula Blanco, Fl. Filip. (1837) 339, ed. 2 (1845) 237, ed. 3, 2:76, saltem pro maxima parte, non Linn.

Cassia nodosa Auct. Philip., non Ham.

Cassia x ‘Palawan cherry’ in Madulid, Cycl. Philipp. Orn. Pl. (2000) 216, f. 216; Madulid, Pict. G. Pl. Pal. (2002) 57, f. 57.

Common/Local Names: Javanese caña fistula, Palawan cherry, Philippine cherry blossom, pink and white shower, pink shower (Eng), aninapla (Tag), antsoan (Bik, Tag), apod-apod (Pal), apostola (Png), bagayong (Ibg), bagiroro (Bik, BisPn), balayan (Pal), balayong (BisPn), baraw (Bik), baru (Bik), caña fistula (Sp), dangkalan (Bik), dulawen (Ilk), duyong (Tag), fugayong (Ibg), kandela-kandela (Pal), kanya-pistula (Bik, Ibg, Ilk, Kpm,

Png, Tag), kapistula (Ilk), kilkil (Sub), malatagum (Bik), maratayong (Tag), matang-ulang (Bik), narandawel (Ilk), pangowasen (Ilk), pistola (BisPn, Mar), tualing bakulaw (Ibg) (Madulid, 2001).

Diagnosis: The species is easily distinguished by its leaflets, which have a wide base and an obtuse to rounded tip and are finely appressed and sparsely pubescent. The flowers are large with pink petals from the bud stage that grow up to 3–4 cm and turn white with pink tinge upon maturity. Calyx is persistently green with red to pink tinge. The pods are cylindrical (to 40 cm long), somewhat segmented or with annular rings. The seeds are chestnut brown, disc-like, and flat.

Taxonomic Notes: Merrill (1910, 1923) recognized *C. javanica*, occurring in the Philippines, as a widespread species, but is morphologically variable in its leaves, flowers, and fruits. As a consequence, he reduced *C. nodosa* as a synonym of *C. javanica* and named a new variety, *C. pubifolia*, a pubescent form of the species. de Wit (1956) supported the observations of other authors (Merrill, Gagnepain, and Corner) that these may be hybrids of *C. javanica* and *C. nodosa*. Madulid (2000, 2002) considered “Palawan Cherry” probably of hybrid origin.

Cassia javanica subsp. *javanica* is considered an accepted name by Roskov et al. (2023), POWO (2023), and WFO (2023).

Distribution: Its natural range is from Indonesia to **Philippines**, Bismarck Archipelago, Papua New Guinea (Irwin & Barneby, 1982; Roskov et al., 2023; WFO, 2023). Noted to be native in Bismarck Archipelago, Borneo, Java, Lesser Sunda

Is., New Guinea, **Philippines** (POWO, 2023).

Introduced into Southern America: Nicaragua, Colombia, Ecuador; Asia-Tropical: Pakistan, India, Assam, West Himalaya, East Himalaya, Sri Lanka, Bangladesh, Thailand, Laos, Vietnam, Cambodia; Pacific: Marianas, Society Is. (POWO, 2023; Roskov et al., 2023; WFO, 2023).

Within the Philippines, *C. javanica* subsp. *javanica* was cited in the literature as widely distributed in the islands of Luzon, Polillo Is. Mindoro, Palawan, Balabac, Burias, Leyte, and Mindanao (de Wit, 1956; Larsen & Hou, 1996; Merrill, 1910, 1923). It is to be presumed that this subspecies is indigenous and naturally occurring as none of the authors mentioned

that it was introduced. However, in Co's Digital Flora of the Philippines (Pelser et al., 2011), it was annotated as introduced to the Philippines and is here proven otherwise.

For *C. javanica* subsp. *javanica* in Palawan, it is clear from historical records based on extant herbarium specimens (see list below) that the species grew in the hills and forests of remote places of the island as early as the start of the 1900s when Palawan was still undeveloped. These specimens obviously point to the origin of the *C. javanica* subsp. *javanica* as a naturally occurring (sub)species in Palawan. This proves the point of Nicolson et al. (2019) that herbarium specimens provide “what, where, when” evidence for species distributions.

The specimens examined for Palawan include the following:

Voucher	Collector	Locality	Year of Collection
US Catalog No. 435779, US00321669* (Fig. 3)	Merrill 809	Separacion Point	1903
US Catalog No. 627068, US00321658* (Fig. 4)	Foxworthy 42135	Palawan	1906
US Catalog No. 439626, US00321659* (Fig. 5)	Mangubat 42135	Balabac Island	1906
US Catalog No. 709408, US00321684* (Fig. 6)	Manalo 7440	Taradungan River	1907
US Catalog No. 872820, US00321657* (Fig. 7); PNH 197196; PNH 102803	Elmer 12698	Brooke's Point, Addison Peak	1911
US Catalog No. 712481, US00321685* (Fig. 8); PNH 46526; PNH 102786	Weber 1556	Busuanga Island	1912
PNH 23001	Celestino & Ramos 105	Sagpangan, Aborlan	1955
CAHUP 5123; CAHUP 5124	Madulid s.n.	Irawan Valley, Puerto Princesa	1989

Separacion Point, a barrio between Narra and Quezon, was the least populated in Palawan, with only 18 individuals according to a census in 1903 (United States Bureau of the Census, 1905). Merrill collected a specimen of *Cassia javanica* in this locality in 1903.

Another specimen identified as *Cassia javanica* was collected along Taradungan River in Taytay (now part of Roxas) in 1907. It was noted by the collector to be very common in the area. In a recent forest survey, it was recommended that a substantial area be declared as a special management area for the protection of a core zone. This indicates that the locality was a natural undisturbed habitat of *C. javanica* subsp. *javanica* (Cuebillas et al., 2016).

Addison Peak is a mountain in Brooke's Point where many new species, then, were collected by early botanists. In Elmer's account of his collection trip in February 1911, Brooke's Point was only accessible by boat from Puerto Princesa (Elmer, 1912c). He described the "beach forest with huge trees...and dense canopy...which then merged with a truly more forested strip." Cogonal and bamboo tussocks were also found. The upper two-thirds of the range was densely wooded.

Tracing the series of Elmer's collection numbers, he collected in fertile damp woods or wooded flats, wooded rivulet, or dense woods at swampy regions at sea level; shrubberies or light woods between the cogon field and the forested swampy belt near the coast; at densely shaded woods or dense forests, jungled woods, wooded flats at 25-feet (7.62 m) altitude, cogonal and bamboo stemmed formation at 50-feet (15.24 m) altitude, deep fertile soil of creek banks of well-shaded woods at

100-feet (30.48 m) altitude; thickets composed of coarse grasses, sedges, and low shrubs in dry hot sterile soil of hillocks at 500 feet (152.4 m); mixed forests on the trail to the north (Elmer, 1912a, 1912b, 1912c). The approximate collection habitat of *Cassia javanica* (Elmer 12698) in Addison Peak was a wooded area somewhere between 30- and 100-feet (9.14–30.48 m) altitude. The *Cassia* specimen was probably collected near a new species of *Loranthus* (Elmer 12699) amongst *Canarium* and *Artocarpus* trees along the banks of Lara River at 30- to 50-feet (9.14–15.24 m) altitude (Elmer, 1913a), *Antidesma ghaesembilla* (Elmer 12703) at 50-feet (15.24 m) altitude (Elmer, 1912a), and *Hypoestes addisoniense* (Elmer 12715) at 100 feet (30.48 m; Elmer, 1913b). Higher collection numbers in his series were collected already in March 1911 at "ledges of waterfalls or on sides of deeply shaded precipices along the Lara River at about 500 feet altitude" (Elmer, 1913a).

Neither Elmer nor Merrill mentioned that their collections were introduced into Palawan. Both authors often annotate their species as introduced or naturalized, if such, in their major works like *Leaflets of Philippine Botany* (1906–1939) and *Enumeration of Philippine Flowering Plants* (1923–1926), respectively. But in the case of *Cassia javanica*, both Elmer and Merrill did not annotate the species or their collections from Palawan as introduced or naturalized. Moreover, some present botanists believe that *C. javanica* subsp. *javanica* is native to Palawan as it is abundant on the island (ERDB, 2013).

Today, in Palawan, *Cassia javanica* is cultivated in parks, schools, hotel gardens, roadsides, and other public places.

Uses: The species is locally used for medicinal purposes. The timber is used as house and furniture building materials. Ornamental (ERDB, 2013; Larsen & Hou, 1996; Madulid, 2021).

Proposed Conservation Status in Palawan: Data Deficient (IUCN 2012).

Other Specimens studied: *Cajano 630* [CAHUP 54906!, CAHUP 54908!, CAHUP 54909!], Luzon, Cavite, Silang, 'cultivated'; *Madulid s.n.* [PNH 165617!], Palawan, Puerto Princesa City, Town Plaza, 'planted'; *Santos s.n.* [PNH 39483!], Luzon, Batangas, Calatagan.

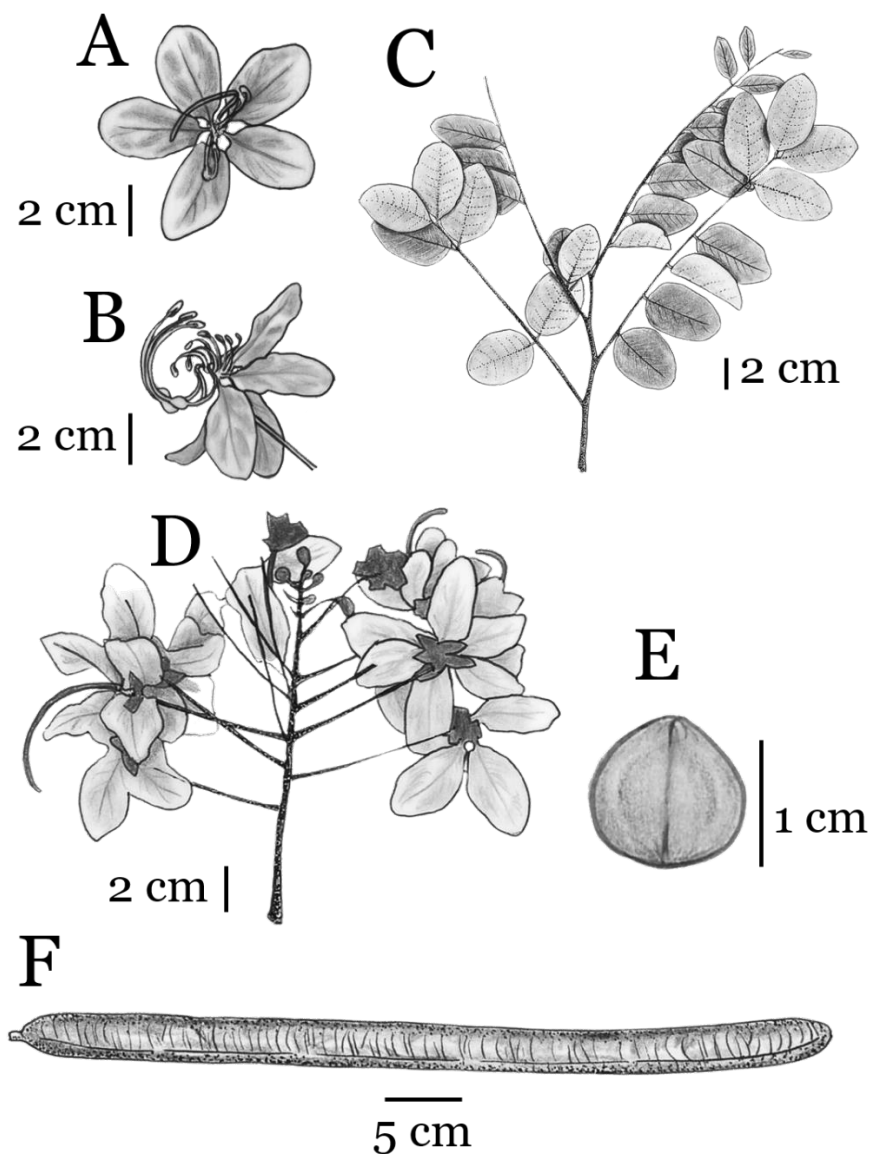


Figure 2. *Cassia javanica* subsp. *javanica*. **A.** front view of flower; **B.** side view of flower; **C.** leaf; **D.** inflorescence; **E.** seed; **F.** pod.



Figure 3. The specimen was collected by Elmer Drew Merrill from Separacion Point in Palawan Island in 1903 with collection no. 809. Courtesy of the United States National Herbarium.



Figure 4. The specimen was collected by Frederick William Foxworthy from Palawan Island in 1906 with collection no. 42135. Courtesy of the United States National Herbarium.



Figure 5. The specimen was collected by L. Mangubat from Balabac Island in Palawan in 1906 with collection no. 42135. Courtesy of the United States National Herbarium.

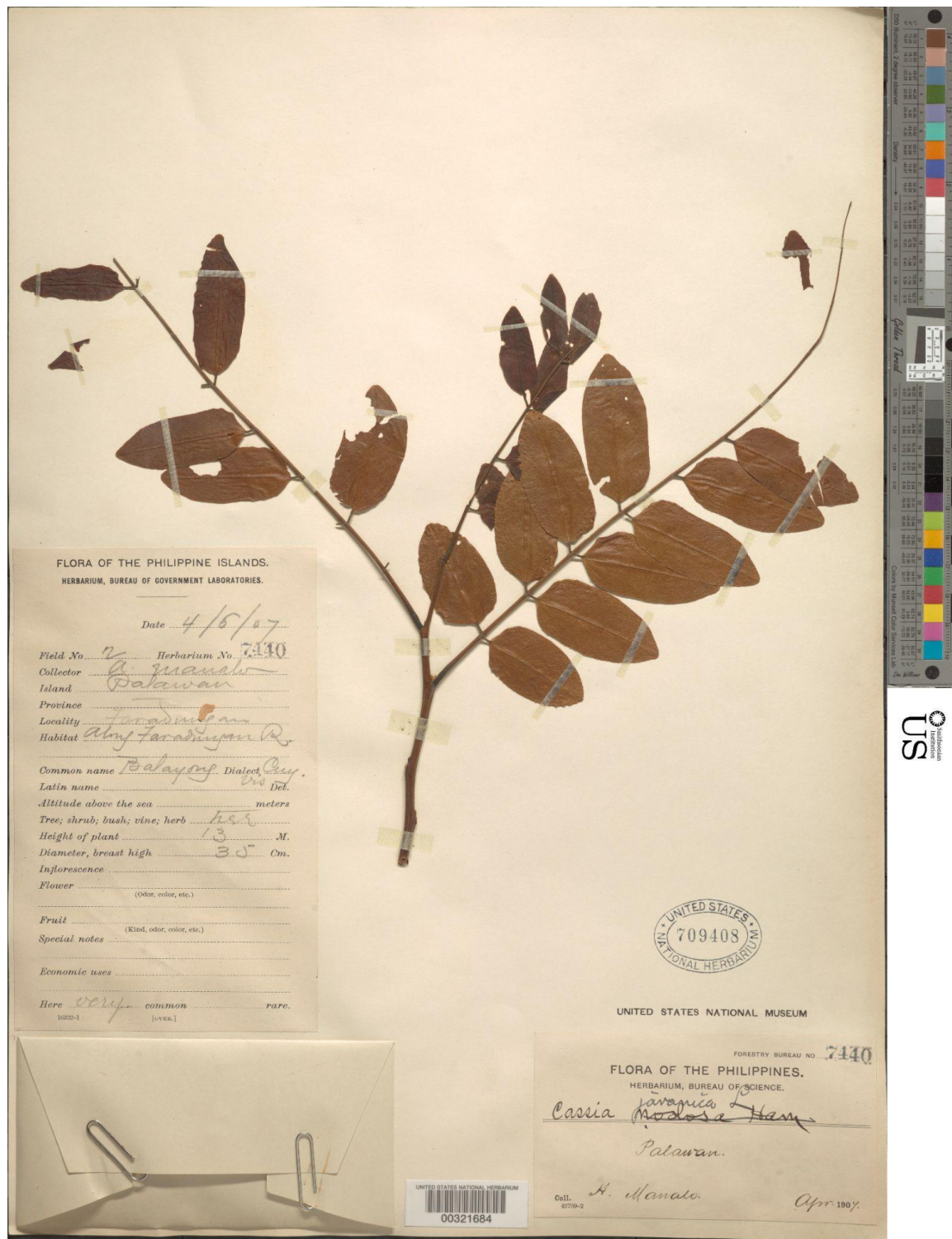


Figure 6. The specimen was collected by A. Manalo along Taradungan River in Palawan in 1907 with collection no. 7440. Courtesy of the United States National Herbarium.



Figure 7. The specimen was collected by Adolf Daniel Edward Elmer from Addison Peak, Brooke's Point in Palawan in 1911 with collection no. 12698. Courtesy of the United States National Herbarium.



Figure 8. The specimen was collected by C.M. Weber from Busuanga Island in Palawan in 1912 with collection no. 1556. Courtesy of the United States National Herbarium.

4. *Cassia javanica* L. subsp. *nodosa* (Buch.-Ham. ex Roxb.) K.Larsen & S.S.Larsen—Fig. 9

Cassia javanica L. subsp. *nodosa* (Buch.-Ham. ex Roxb.) K.Larsen & S.S.Larsen, Nat. Hist. Bull. Siam Soc. 25 (1974) 205; Larsen & Ding Hou, Fl. Mal. 12 (1996) 560; Madulid, Cycl. Philipp. Orn. Pl. (2021) 395, f. 395.

Synonyms:

Cassia nodosa Buch.-Ham., Mem. Wen. Nat. Hist. Soc. 6 (1832): 312, nom. inval.

Cassia nodosa Buch.-Ham. ex Roxb., Fl. Ind. (Roxburgh) 2 (1832) 336; de Wit, Webbia 11 (1956) 223; Madulid, Cycl. Philipp. Orn. Pl. (2000) 215, f. 215.

Cathartocopus nodosus (Buch.-Ham. ex Roxb.) Steud., Nomencl. Bot. 2 (1840) 311.

Cassia javanica L. var. *indochinensis* Gagnep., Fl. Gen. Indochine 2 (1916) 158; Irwin & Barneby, Mem. N.Y. Bot. Gard. 35 (1982) 50; Luckow, Bailey 23 (1996) 205.

Cassia indochinensis (Gagnep.) V.Singh, J. Econ. Taxon. Bot. 10 (1988) 327.

Common/Local Names: Palawan cherry, pink shower (Eng.) (Madulid, 2001).

Diagnosis: The species is easily recognized by its leaflets, which have a wide base and acute tip. The racemes are somewhat hairy and are borne on lateral shoots. The flowers are smaller than *C. javanica* subsp. *javanica*. The petals grow up to 2–3 cm and turn from pink to white. The sepals are persistently red from bud to maturity. The style and anthers are glabrous, and the filaments are slightly hairy near the base. The pods are 30–40 cm long and smooth. The seeds are elliptic in shape and have a lighter shade than *C. javanica* subsp. *javanica*.

Taxonomic Notes: The species is closely similar to *C. javanica* subsp. *javanica*, but can easily be differentiated by its slightly smaller flowers, persistent red calyx, and smooth pod.

Cassia javanica L. subsp. *nodosa* is considered as an accepted name by Roskov et al. (2023) and POWO (2023). However, the taxon was considered a synonym of *Cassia javanica* subsp. *agnes* (de Wit) K.Larsen in the WFO database (2023) based on the outdated ILDIS database.

Distribution: Its natural distribution is from India, Indonesia, Bangladesh, Myanmar, Andaman Islands, to Southern Thailand, Peninsular Malaysia, Java, and Lesser Sunda Islands (Roskov et al., 2023).

Introduced into Africa: Zaire, Uganda, Seychelles; Asia-Temperate: China; Asia-Tropical: Pakistan, Bhutan, Laos, Sri Lanka, Singapore, Papua New Guinea; Pacific: Fiji (Roskov et al., 2023).

It is cultivated in many areas in the Philippines. In Palawan, it is widely cultivated in urban areas.

Uses: Ornamental.

Specimens studied: Domingo PPP19003 [DLSUH 6343!], Palawan, Puerto Princesa City, Palawan State University Campus; Domingo PPP19005 [DLSUH 6344!], Palawan, Puerto Princesa City, Palawan State University Campus.

Other specimens studied: Domingo SJC23002 [DLSUH 6346!], Luzon, National Capital Region, San Juan City, Pinaglabanan Mini Park; Payawal et al. 786 [CAHUP 26546!, CAHUP 5335!], Luzon, Quezon Province, Dolores, Sta. Lucia School; Lantican s.n. [CAHUP

10219!], Luzon, Laguna, Los Baños,
Forestry College; *Sulit 1523* [PNH 8358!],
Luzon, Laguna, Makiling National Park,

Forestry Plantation, 'planted and
naturalized'; *Elmer 5661* [PNH 29114!],
Luzon, La Union, Bauang.

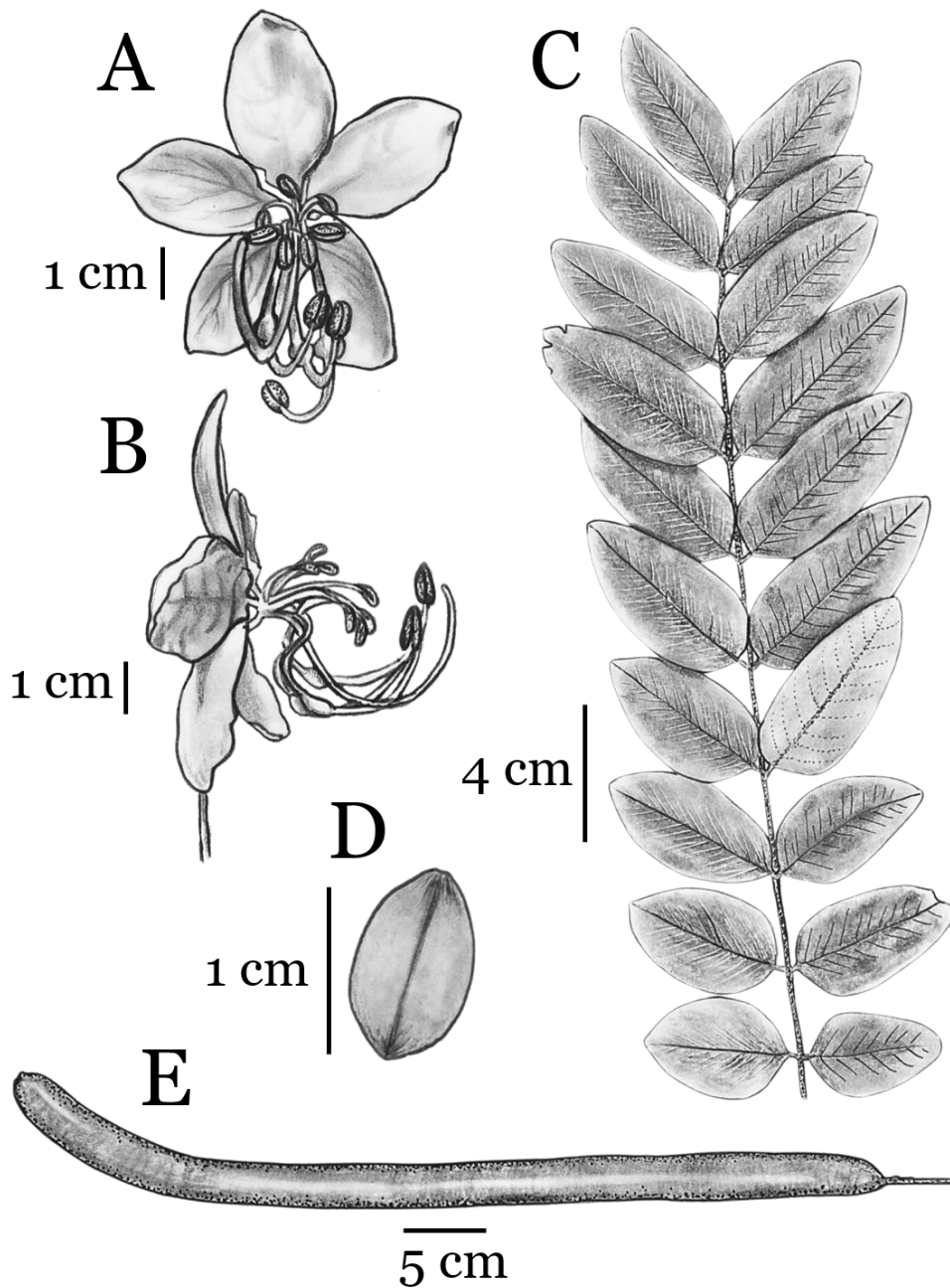


Figure 9. *Cassia javanica* subsp. *nodosa*. **A.** front view of the flower; **B.** side view of flower; **C.** leaf; **D.** seed; **E.** pod.

CONCLUSION

Based on the above analysis and discussion, it is established that there are actually three species of *Cassia* in the Philippines: *C. fistula*, *C. grandis*, and *C. javanica*. *Cassia javanica* is a highly polymorphic species, which is divided into three subspecies: *C. javanica* subsp. *javanica*, subsp. *nodosa*, and subsp. *pubifolia*. Three species of *Cassia* occur in Palawan, namely, *C. fistula*, *C. grandis*, and *C. javanica* with two subspecies, that is, subsp. *javanica* and subsp. *nodosa*. The two subspecies are distinguished by minor characteristics of the leaves, flowers, pods, and seeds.

The major information about *Cassia* in the Malesian Region, including the Philippines, is provided by de Wit (1956), Irwin and Barneby (1982), K. Larsen (1993), and subsequently elaborated by Larsen and Hou (1996). de Wit (1956) and Irwin and Barneby (1981, 1982) recognized *C. javanica* var. *javanica* and *C. javanica* var. *pubifolia* as indigenous to the Philippines. Recognizing the expert knowledge gained by Irwin and Barneby in their three-decade study of *Cassia*, Larsen (1993) and consequently Larsen and Hou (1996) adopted the delineations of the different kinds of *C. javanica* and elevated these to subspecies. In all these monographs, *Cassia javanica* subsp. *javanica* is recognized as naturally occurring in the Philippines, Indonesia, and Papua New Guinea and subsp. *pubifolia*, which was misspelled as *pubiflora* in Larsen (1993), Larsen and Hou (1996), and subsequent taxonomic databases, as endemic to the Philippines.

The specific localities as cited in the literature support the fact that *C. javanica* subsp. *javanica* naturally occurs in

Palawan, Busuanga, Balabac, and other places like Luzon, Polillo Is. Mindoro, Burias, Leyte, and Mindanao. On the other hand, *C. javanica* subsp. *nodosa*, *C. grandis*, and the yellow-flowered *C. fistula* are all introduced into Palawan.

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