

Research paper

## ***Cordia dentata* Poir. (Boraginaceae), a Newly Naturalized Plant in Taiwan**

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### **ABSTRACT**

This article reports on *Cordia dentata* Poir. which has become a naturalized Boraginaceae species in Taiwan. The species is distinguished by a striated calyx that splits circumscissily or tears irregularly and by a yellow twisted corolla that is notably larger than those of related taxa. It is native to tropical America, particularly Central America and the Caribbean, and is valued for its medicinal properties. Field observations confirm self-sustaining cohorts at several introduction sites. These observations meet the C3 naturalization criteria defined by Blackburn et al., indicating that the species is recently naturalized rather than invasive. This study provides a detailed morphological description, photographs, a distribution map, and a key for identifying wild *Cordia* L. species in Taiwan.

**Keywords:** *Cordia* L., Boraginaceae, newly naturalized, Taiwan

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## INTRODUCTION

*Cordia* L., comprising approximately 300 species, is the largest genus in the Boraginaceae. It is widely distributed across the pantropical regions, with a strong center of diversity in the Americas (Miller 2023). Members of the genus include trees and shrubs, often characterized by conspicuous hairs. The leaves are alternate, typically with canaliculate petioles. Inflorescences range from cymose to panicle forms. The corolla is tubular, with reflexed to spreading lobes, or may be campanulate or funnellform, consisting of five lobes. The calyx usually persists at the base of the fruit, which contains a single seed with plicate cotyledons (Hsiao and Liu 1998, Miller 2023).

In Taiwan, two species of *Cordia* have been recorded: *C. aspera* G. Forst. subsp. *kanehirae* (Hayata) H.Y. Liu and *C. dichotoma* G. Forst. (Hsiao and Liu 1998). Among them, *C. aspera* subsp. *kanehirae* is endemic to low-altitude forests in southern Taiwan and on Lanyu island (Liu 1998), and is classified as an endangered (EN) species (Editorial Committee of the Red List of Taiwan Plants 2017). On the other hand, *C. dichotoma* is widely recognized as a culturally significant plant in Taiwan. It has been used for medicinal and folkloric purposes by various ethnic groups, including Han Chinese, Hakka, and nearly all Indigenous peoples (Azizur and Juber 2016, Yang and Wen 2021, Tripathi 2023). Taiwan is also the only place in the world where the fruits of *C. dichotoma* are used as an ingredient in local cuisine (Yang and Wen 2021). This unique culinary application has sparked debate over whether the plant is native to Taiwan. The *Chongxiu Fujian Taiwan Fuzhi* (Liu 1741) reports that the salt-roasted fruits of *C. dichotoma* were served as

a viscous relish and reputed to relieve gastric stasis. A later county chronicle, the *Fengshan Xianzhi* (Chen 1802), echoes this practice, noting that the pickled fruits remained “edible and helpful for clearing food accumulations.” These records indicate that Han communities in southern Taiwan had already incorporated the species into everyday cuisine by the early nineteenth century, paving the way for its subsequent naturalization. Recent perspectives suggest that *C. dichotoma* is a naturalized plant, introduced and escaped from cultivation (Chang-Yang et al. 2022). However, the exact timing of its introduction remains uncertain. *Cordia subcordata* Lam. was also previously reported from Tungsha (Pratas) Island, situated between Taiwan, Hainan, and Luzon (Huang et al. 1994). Its first record on Taiwan’s main island was recently documented for the Hengchun Peninsula, where a solitary tree, believed to have originated from a sea-drift propagule, has been flowering and fruiting since 2023 (Chung et al. 2025).

Recently, we observed that the characteristics of a population located near a Paiwan tribal village in Danlin, Pingtung, differ from those of known wild *Cordia* species found in other regions of Taiwan. Through a comparison of the type specimen and morphological descriptions provided in the revision of *Cordia* (Miller 2023), we identified this previously unrecognized population as *C. dentata* Poir. This paper presents a detailed description of *C. dentata*, together with photographs, a distribution map, and an identification key that distinguishes it from other *Cordia* species occurring in Taiwan, together intended as references for accurate identification.

## MATERIALS AND METHODS

### Specimen collection and herbarium survey

Materials were collected from the field; voucher specimens were deposited in the herbarium of National Chung Hsing University (TCF) and the herbarium of the National Museum of Natural Science (TNM). Additionally, the following herbaria were examined: HAST, PPI, TAIE, TAIF, TCF, and TNM (herbarium acronyms follow the Index Herbariorum; Thiers 2025, continuously updated). Specimens of *C. dentata* were found only in some of these collections.

### Morphological observation

External morphology of branches, leaves, flowers, and fruits was documented using a Nikon D750 digital camera fitted with a zoom lens (Nikon AF-S NIKKOR 24-120 mm f/4G ED VR) and a macro lens (Nikon AF-S Micro 105 mm f/2.8G IF-ED VR). Quantitative morphological characters were measured in ImageJ v. 1.8.0 (Rasband 1997, Schneider et al. 2012), and their observed ranges were recorded.

### Distribution map

The distribution map of geographical climatic regions and altitudinal vegetation zones of Taiwan follows Su (1984, 1985). The map was generated using QGIS ver. 3.4 with package of Lin (2018).

## RESULTS AND DISCUSSION

### Morphological characters distinguishing wild *Cordia* species in Taiwan

The four wild *Cordia* species of Taiwan can be accurately distinguished and identified through a combination of floral traits, calyx

sculpture, and leaf size and indumentum (Hsiao and Liu 1998, Friday and Okano 2006, Miller 2023) (Table 1). Flower color together with corolla diameter provides the quickest first cue. *Cordia aspera* subsp. *kanehirae* and *C. dichotoma* have small white to pale-yellow flowers, usually less than 8 mm across, with corollas that are flat or only slightly contorted. In contrast, *C. dentata* and *C. subcordata* bear flowers more than 10 mm in diameter with strongly contorted corollas; the former is bright yellow, whereas the latter is vivid orange-red. Examination of the persistent calyx offers a second distinction: The calyx tube of *C. aspera* subsp. *kanehirae* bears deep longitudinal ribs that remain prominent at fruiting, *C. dichotoma* has a smooth unribbed tube, *C. subcordata* shows fine surface striations that do not form high ribs, and *C. dentata* possesses a similarly smooth but thinner tube. Leaf morphology adds an additional layer of taxonomic resolution. Leaves of *C. aspera* subsp. *kanehirae* exceed 11 cm in length and are densely pubescent on both surfaces; whereas those of *C. dichotoma* are usually shorter than 10 cm, nearly glabrous above and sparsely hairy along the abaxial veins. *Cordia subcordata* also has leaves longer than 11 cm, but they are completely glabrous, while *C. dentata* has leaves under 10 cm that are covered with short appressed hairs on both sides and bear blunt serrations along the margins, giving a slightly rough texture.

By cross-referencing these three suites of characters in the field or herbarium, specimens can be rapidly identified: first separate the small, pale-flowered taxa from the large, yellow-orange-flowered taxa based on corolla color and size; then use calyx ribbing to distinguish between the two small-flowered species; and finally rely on leaf size and indumentum to differentiate the two large-

**Table 1. Comparative overview of the four wild *Cordia* taxa recorded in Taiwan.**

Taxon	<i>C. dentata</i>	<i>C. dichotoma</i>	<i>C. aspera</i> subsp. <i>kanehirae</i>	<i>C. subcordata</i>
Leaf	3-12 cm long, 3-7 cm wide	6-15 cm long, 4-10 cm wide	7-22 cm long, 3-10 cm wide	8-18 cm long, 6-13 cm wide
Indumentum	pubescent	glabrous	pubescent	glabrous
Flower size	1.2-1.7 cm	0.3-0.8 cm	0.3-0.8 cm	3.5-4 cm
Corolla	contorted	flat or contorted	flat or contorted	contorted
Corolla color	vivid yellow	white	white-creamy	vivid orange
Calyx	finely striate	smooth	with pronounced longitudinal ribs	finely striate
Fruit size	8.9-11 mm in diam.	7-10 mm in diam.	7-12 mm in diam.	20-30 mm in diam.
Distribution	Naturalized; southern and southwestern Pingtung County, growing in sunlit dry scrub or gravelly wasteland below 100 m elevation	Naturalized and commonly planted; almost island-wide, most frequent below 1,000 m in open scrub, orchards and secondary woodland	Endemic to Hengchun Peninsula and Lanyu, Taiwan; scattered in low-elevation ( $\leq 150$ m) tropical broad-leaf forest edges and river terraces	Very rare in Taiwan, one coastal tree on Hengchun Peninsula (Chung et al. 2025) and an earlier record from Tungsha (Pratas) Island (Liu 1998); restricted to coral-reefs or sandy coastal depressions, alt. $\leq 20$ m.
Conservation status in Taiwan	Naturalized (NA)	Naturalized (NA)	Endangered (EN)	Status not yet assessed
Documented or notable uses	Medicinal uses are reported elsewhere (Thirupathi et al. 2008), but in Taiwan only its adhesive mucilage is mentioned by the media (Dai 2023) and no practical applications are recorded.	Immature drupes widely pickled and used as a condiment; bark, leaves and seeds valued in folk medicine for anti-inflammatory and digestive remedies (Jamkhande et al. 2013)	No specific use recorded in Taiwan.	Lightweight, easy-to-carve timber for bowls, paddles and small boats; sticky fruit pulp formerly used as a natural glue; ornamental and medicinal in Pacific cultures (Friday and Okano 2006)

Source: Hsiao and Liu (1998) and this study.

flowered species. The unique combination of bright yellow large flowers, densely hairy small leaves with blunt marginal teeth, and a smooth persistent calyx is diagnostic for *C. dentata*, providing the most reliable boundary between this species and its congeners.

### Distribution and habitat of *Cordia dentata* in its native range and in Taiwan

*Cordia dentata* is native to the broad belt of seasonally dry tropical forests extending from the southeastern United States through

Mexico and Central America to northern South America, and is also common on most islands of the Caribbean (Standley and Steyermark 1949). Within this range the species occurs at elevations of 0-900 m, with the highest frequencies on coastal lowlands, xeric hills, river terraces, and calcareous or sandy slopes. Individuals remain evergreen under normal conditions but shed their foliage during prolonged droughts (Barwick 2004). Due to its broad geographic range and large populations, *C. dentata* is considered demographically stable (Azizur and Juber 2016, Miller 2023).

In Taiwan *C. dentata* is confined to the southern and southwestern parts of Pingtung County, entirely within the southwestern climatic region defined by Su (1984, 1985) and within the low-elevation *Ficus-Machilus* vegetational zone below 500 m. All verified records come from dry scrub or gravelly ground at elevations under 100 m, usually on rural wasteland or secondary grassland that receives full sun and drains rapidly. These site conditions closely resemble those in the plant's native range (Lamarck and Poiret 1806, Standley and Steyermark 1949, Barwick 2004, Miller 2023).

Comparison with the other wild *Cordia* species in Taiwan underscores this ecological distinction (Table 1). *Cordia dichotoma* occupies broadly similar habitats but, owing to centuries of cultivation as a food plant, now occurs almost island-wide and reaches elevations of about 1,000 m (Hsiao and Liu 1998). *Cordia subcordata* is restricted to coral-reef or sandy coastal depressions (Friday and Okano 2006, Chung et al. 2025), whereas *C. aspera* subsp. *kanehirae* is largely confined to low-elevation tropical broadleaf forest in the Hengchun Peninsula and Lanyu (Orchid Island) (Liu 1998).

### Seed dispersal ecology of *Cordia dentata*

*Cordia dentata* produces small, single-seeded fleshy drupes with a sweet, mucilaginous pulp, a trait consistent with the typical vertebrate-frugivore dispersal syndrome. Morphological analyses underscore the suitability of these fruit for ingestion by small to medium-sized animals (Hsiao and Liu 1998, Thirupathi et al. 2008, Miller 2023). Field observations and feeding trials have verified that passerine birds, frugivorous bats such as *Glossophaga* and *Artibeus*, and mantled howler monkeys ingest the fruits and subsequently defecate viable seeds, establishing endozoochory as the principal dispersal mechanism (Glander 1975, Opler et al. 1975, Ramírez-Pulido et al. 1993, Ramos-Robles et al. 2018). Network and seasonality studies further identify *C. dentata* as a keystone connective resource within Neotropical dry-forest frugivore webs, indicating that its dispersal depends on the functional integrity of these animal guilds (Ramos-Robles et al. 2018). Epizoochory via adhesion of the sticky pulp to fur or feathers has also been proposed but remains unsupported by direct evidence (Glander 1975, Opler et al. 1975).

Several vertebrate guilds in Taiwan can act as seed vectors for *C. dentata*. Passerine birds are abundant in open scrub and routinely ingest small berries and drupes (Opler et al. 1975, Huang and Wang 2000, Kamei and Ohkawara 2022). The Ryukyu flying fox (*Pteropus dasymallus*), though locally scarce, persists along the southern coast and is documented to transport small seeds over several kilometers (Wu et al. 2022). The endemic Formosan rock macaque (*Macaca cyclopis*) also consumes a wide range of fleshy fruits and deposits viable seeds in forest edges and secondary growth (Su and

Lee 2001). These bird, bat, and primate guilds overlap spatially and seasonally with known *C. dentata* sites, suggesting that endozoochory is probably the principal mechanism of local dispersal (within a few kilometers). In addition, abundant seedling recruitment immediately beneath parent trees indicates that barochory (gravity-driven seed fall) sustains population renewal at each locality. Together, escape from cultivation, followed by animal-mediated dispersal and on-site barochory, provides a plausible pathway for the establishment and gradual expansion of *C. dentata* in Taiwan.

#### Medicinal value of *Cordia dentata*

*Cordia dentata* has been recorded in the Neotropics as a multipurpose medicinal plant: the sweet, sticky drupes are swallowed as diaphoretic and emollient tonics for cough and chest congestion, while leaf infusions are drunk for analgesic, anti-inflammatory, and anti-rheumatic relief, and charcoal from the wood is applied to minor skin ailments (Thirupathi et al. 2008). Phytochemical screening confirms the presence of Rosmarinic acid, Quercetin, and 3-o-rutinoside together with triterpenes, flavonoids, and phenolic acids, a profile consistent with other pharmacologically active *Cordia* species (Thirupathi et al. 2008, Azizur and Juber 2016). *In-vitro* assays have shown that ethanolic leaf extracts or chromatographic fractions of *Cordia dentata* inhibit *Leishmania* promastigotes or amastigotes at low-micromolar concentrations with negligible hemolysis and only moderate cytotoxicity, warranting further antiprotozoal investigation (Espitia-Baena et al. 2014, Cervantes Ceballos 2017). The fruit mucilage, traditionally used as a natural glue, is now being evaluated as a biodegradable polymer for food, cosmetic,

and pharmaceutical formulations because of its high biocompatibility and low toxicity (Haq et al. 2016a, 2016b, Constantine et al. 2023). Although no licensed phytopharmaceuticals currently derive from *C. dentata*, successful topical anti-inflammatory products developed from congeners such as *C. verbenacea* and *C. myxa* suggest that, given additional efficacy and safety data, this species may have comparable commercial prospects (Thirupathi et al. 2008). In Taiwan, media reports have only noted that the mucilage may function as a natural adhesive analogous to that of *C. dichotoma* (Dai 2023); no clinical or ethnobotanical applications have yet been recorded.

#### Taxonomic placement and early naturalization of *Cordia dentata* in Taiwan

*Cordia dentata* belongs to the predominantly Neotropical subgenus *Cordia* sect. *Cordia*, which is distinguished by an indehiscent one-seeded drupe and a campanulate calyx that typically splits circumscissily at fruiting (Johnston 1930, 1940, Miller 2001, Gottschling et al. 2005, Pedro-Silva et al. 2021). Within this section *C. dentata* is readily distinguished by its striate, textured calyx, which often ruptures irregularly in addition to splitting at the circumscissile line, and by its vivid yellow corolla. This corolla's contorted limb exceeds 10 mm in diameter, noticeably larger than the white, < 8 mm corollas of *C. dichotoma* and *C. aspera* subsp. *kanehirae* or the orange corolla of *C. subcordata* (Lamarck and Poiret 1806, Johnston 1940, Hsiao and Liu 1998, Liu 1998, Miller 2023, Chung et al. 2025).

The species is native to seasonally dry tropical forests from the southeastern United States through Central America and the Caribbean, where it occurs from sea level to about 900 m and is valued locally for its

diaphoretic and anti-inflammatory properties (Thirupathi et al. 2008). In Taiwan it has so far been recorded only from rural wasteland and dry scrub below 100 m in southern Pingtung County, sites that mirror the open, well-drained habitats of its native range yet are widely separated from any documented palaeogeographic dispersal corridors. Its absence from historical floras, combined with the proximity of the population to cultivated plots, and the presence of juvenile plants both beneath the parent tree and in nearby grassland, together suggest a recent escape from horticulture that has begun to recruit naturally. *Cordia dentata* populations in Taiwan have established self-sustaining cohorts at multiple introduction sites. These observations satisfy the C3 naturalization criteria of Blackburn et al. (2011), indicating that the taxon is recently naturalized rather than invasive. Continued monitoring is needed to detect any future range expansion.

## TAXONOMIC TREATMENT

Key to wild *Cordia* L. species in Taiwan, compiled from Chung et al. (2025), Hsiao and Liu (1998), Miller (2023), and Friday and Okano (2006).

1. Flower white or light yellow, small, < 8 mm in diam., corolla flat or contorted.
2. Persistent calyx with prominent longitudinal ribs; leaves larger, often > 11 cm length, pubescent on both surfaces.....*C. aspera* subsp. *kanehirae* (金平氏破布子)
2. Persistent calyx smooth, lacking prominent longitudinal ribs; leaves smaller, often < 10 cm length, glabrous except along veins on abaxial surface ..... *C. dichotoma* (破布子)
1. Flower vivid yellow or vivid orange, large, > 10 mm in diam., corolla contorted.
3. Flower vivid orange; leaves larger,

often > 11 cm length, glabrous on both surfaces ..... *C. subcordata* (橙花破布木)

3. Flower vivid yellow; leaves smaller, often < 10 cm length, pubescent on both surfaces.....*C. dentata* (齒葉破布木)

***Cordia dentata*** Poir., Lamarck, Encycl. Meth., Bot. 7: 48 1806; *Carpiphea dentata* (Poir.) Raf., Sylva Tellur. 39 1838. **TYPE:** Korsou. Curaçao, 1799, *M. Vahl s. n.* (holotype: P-JU; Microfiche: MO).

齒葉破布木 (Figure 1)

*Cordia calyptrata* Bert. ex Spreng., Syst. Veg., ed. 16 [Sprengel] 1: 649 1824; *Varronia calyptrata* DC., Prodr. [A. P. de Candolle] 9: 469 1845. **TYPE:** MEXICO. Veracruz: Near Vera Cruz, elev. 340.8 m, 1839, *J.J. Linden 284* (holotype: BR; isotypes: BR6960810, image!, K820498, image!, GENT, MICH).

*Cordia ovata* Brandegee, Univ. Calif. Publ. Bot. 10: 187 1922. **TYPE:** MEXICO. Remudadero, 19°15'00"N, 96°33'36"W, *C.A. Purpus 8937* (holotype: UC205972, image!; isotypes: GH94855, image!, MO193283, image!, NY, US).

Tree or tall shrub up to 7(-10) m tall, crown spreading, bark fissured, twigs puberulent, rarely approaching villous, later lenticellate. Leaves semi-deciduous; blades elliptic to widely elliptic or ovate, 3-12 cm long; 3-7 cm wide, apex obtuse, base obtuse to rounded, margin nearly entire or slightly undulate or serrate, with small denticulate teeth, adaxial surface strigillose, hairs borne on a flat, broad pedestal, abaxial surface nearly glabrous to puberulent, with dense tufts of curly hairs in the axils of major veins; petioles 2-10 mm long, narrowly canaliculate on adaxial surface, puberulent to sparsely strigillose. Inflorescences terminal, cymose-paniculate, 5-20 cm broad, often with 20

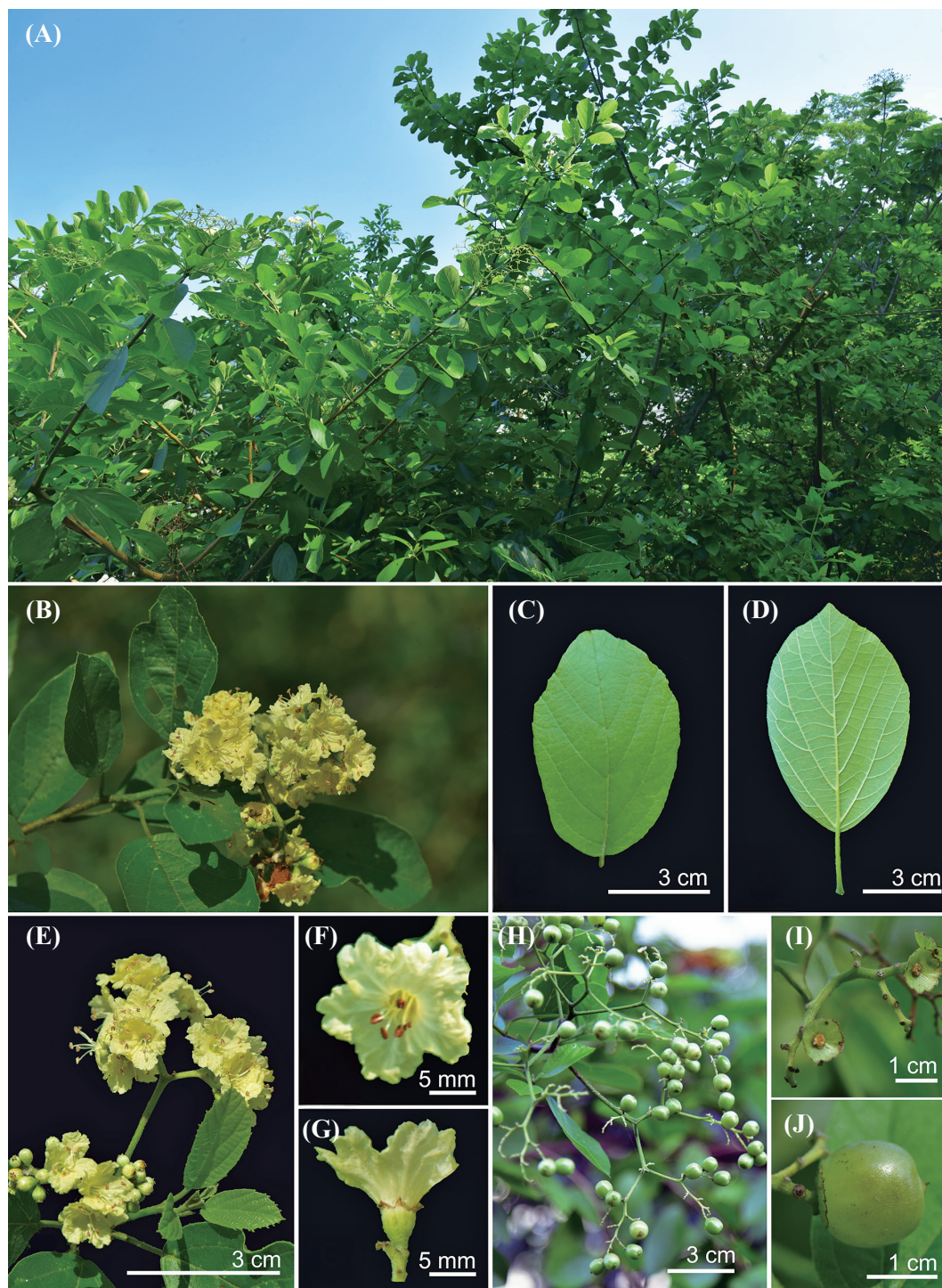


Figure 1. *Cordia dentata* Poir. (A) Habitat (B) Habit (C) Leaves, adaxial view (D) Leaves, abaxial view (E) Inflorescence (F) Flower, front (G) Flower and calyx, side (H) Infructescence (I) Persistent calyx (J) Fruit.

or more flowers, branches puberulent to sparsely strigillose. Flowers nearly sessile; calyx campanulate, 3-3.8 mm long, 2.4-3.5 mm wide at the mouth, circumscissile and opening somewhat unevenly, striate with 10(-12) lines, but not distinctly ribbed, sparsely strigillose; corolla contorted in aestivation, yellow, funnellform, 0.9-1.2 cm long, 4-6 mm wide, 5-lobed, lobes depressed ovate, often emarginated, 1-4 mm long, 4.5-7.5 mm wide, the tube 2.5-5 mm long; stamens 5-6, filaments 4.7-9.4 mm long, upper 1.5-5.5 mm free, nearly glabrous to puberulent at the point of insertion, anthers ellipsoid to oblong, 1.2-1.9 mm long; ovary ellipsoid to globose, 1-1.5 mm long, 0.8-1.4 mm broad, glabrous; disc crateriform, 0.2-0.4 mm tall, 0.8-1 mm broad, glabrous; style 3.5-5.3 mm long, stylar branches 1.4-3 mm long, stigma lobes clavate. Fruits borne in saucer-shaped calyx, translucent white, drupaceous, ellipsoid, 8.9-11 mm long, 5.5-7.2 mm broad, endocarp bony, 1-seeded.

**Distribution:** *Cordia dentata* is distributed in low-altitude regions, ranging from Mexico through Central America to Colombia and Venezuela, as well as the West Indies. It is one of the most typical and abundant species in the tropical Americas (Lamarck and Poiret 1806, Johnston 1940, Miller 2023).

In Taiwan, *Cordia dentata* is cultivated in certain botanical gardens and farms. In the wild, this naturalized species is currently concentrated in a few habitats within Pingtung County, primarily in rural areas (Figure 2). It is hypothesized that the species has gradually proliferated in the wild following cultivation. Its distribution is restricted to open areas at low altitudes (below 100 m). The largest population was recorded in Tanlin, Laiyi Township (Pingtung County), where approximately 40 individuals at various growth stages were documented

within the surveyed area. This indicates that the species has successfully established and is growing naturally in this habitat. Although its current dispersal ability seems constrained, possibly due to fragmentation caused by roads or rivers, its widespread distribution across tropical America (Johnston 1940, Miller 2023) suggests a high potential for adaptation and dispersal, highlighting its invasive potential.

**Specimens examined:** TAIWAN. Pingtung County (屏東縣): Laiyi Township (來義鄉), Tanlin (丹林), elev. 99 m, 22°31'08.8"N, 120°37'50.5"E, 23 Jul. 2015, *Chiu-Mei Wang 16316* (TNM); same loc., 1 Aug. 2018, *Chiu-Mei Wang 17617* (TNM); same loc., 24 Jul. 2022, *Chiu-Mei Wang 19428* (TNM); same loc., 12 Oct. 2024, *Chih-Yi Chang & Pei-Hua Li 4358* (TCF); Changzhi Township (長治鄉), elev. 65 m, 22°42'12"N, 120°35'02"E, 1 Aug. 2018, *Chiu-Mei Wang 17613* (TNM); Yanpu Township (鹽埔鄉), Yanzhong Village (鹽中村), elev. 99 m, 22°44'46"N, 120°35'02"E, 12 Jul. 2020, *Chiu-Mei Wang 18472* (TNM); Fangliao Township (枋寮鄉), Neiliao Village (內寮村), elev. 17 m, 22°22'54"N, 120°36'45"E, 24 Jul. 2022, *Chiu-Mei Wang 19427* (TNM); Hengchun Township (恆春鎮), elev. 41 m, 21°56'56"N, 120°44'23"E, 28 Mar. 2018, *Chiu-Mei Wang 17327* (TNM). Sandimen Township (三地門鄉), Saichia (賽嘉), landing zone for paragliders (滑翔傘著陸區), 16 Aug. 2001, cultivated, *Sheng-Zehn Yang 25832* (PPI, TAIF).

**Note:** The type specimen of this species was collected by von Rohr in Curaçao, later described and illustrated by Vahl (Johnston 1940). However, its formal publication was made by Poiret based on von Rohr's specimens provided by Vahl (Lamarck and Poiret 1806). This reflects the common practice of transnational specimen exchange and collaboration in plant taxonomy during

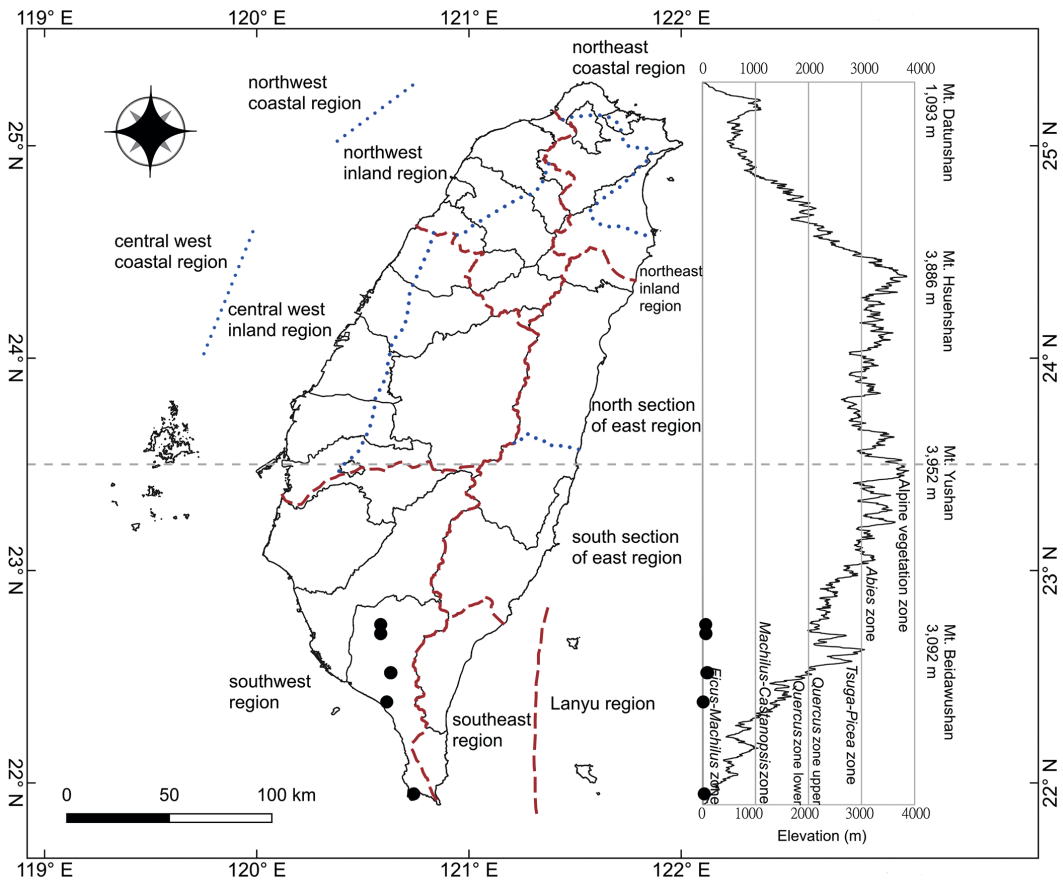


Figure 2. Distribution map of *Cordia dentata* Poir. in Taiwan.

the 18<sup>th</sup> and 19<sup>th</sup> centuries (Johnston 1940).

## CONCLUSION

This study confirms that *C. dentata* is firmly established as a naturalized species in Taiwan. All verified populations occur in the coastal lowlands of southwestern Taiwan below 100 m elevation, an area that matches the warm, seasonally dry regime of its native Neotropical dry forests. Current confinement to this narrow zone is probably shaped by two interacting factors: (1) Endozoochorous dispersal which keeps most propagules within local scrub, fallow fields, and hedgerows;

and (2) the buffering effect of the tropical dry forest that provides the moisture pulses needed for germination while limiting cold season expansion into cooler districts. Even so, the trees produce abundant fruit, resprout readily after cutting, and show high seedling recruitment—traits that collectively indicate a strong capacity for future spread. Continued long-term monitoring at the margins of the present range is therefore warranted so that any incipient expansion into mesic or higher-elevation habitats can be detected and managed promptly.

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研究報告**齒葉破布木：臺灣新歸化紫草科植物**張之毅<sup>1</sup>、王秋美<sup>2</sup>、曾彥學<sup>1,3</sup>**摘 要****背景**

破布木屬 (*Cordia L.*) 為紫草科 (Boraginaceae) 中最大的屬，全球約300種，熱帶美洲多樣性最高。臺灣既有三個野生分類群：包含特有且瀕危的金平氏破布子 (*C. aspera* G. Forst. subsp. *kanehirae* (Hayata) H.Y. Liu)、廣泛歸化並具食用文化的破布子 (*C. dichotoma* G. Forst.)，以及近期的海漂型稀有新紀錄橙花破布子 (*C. subcordata* Lam.)。本研究近年於屏東來義鄉丹林部落周邊，發現一未知破布木屬植物族群，其形態特徵與前述已知物種不符。本研究經比對標本與文獻後，確定為齒葉破布木 (*C. dentata* Poir.)，本文報導為臺灣新歸化種，並評估其分類位置與早期歸化現況。

**材料與方法**

本研究於2015-2024年間在屏東縣六鄉鎮採集標本，並檢查HAST、PPI、TAIE、TAIF、TCF和TNM等標本館藏。使用數位相機拍攝與量化枝、葉、花、果外部形態。分布圖以地理資訊軟體套用分布圖模板，疊加地理氣候分區與植群分帶。

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## 結果與討論

齒葉破布木的花冠鮮黃、具皺褶，直徑約1 cm；花萼帶細條紋；葉片細小，具鋸齒緣並密被短毛。憑此特徵可與以下類群區分：具白花且花萼平滑的破布子，白花而花萼具深縱肋的金平氏破布子，以及花冠橙色的橙花破布子。野外族群僅見於屏東縣南、西南部海拔 < 100 m 的乾燥灌叢或礫石地；此環境與其原生地中美洲熱帶季乾林相似。最大族群位於來義鄉丹林，約40株，並已觀察到幼株自然更新。果實甜黏，與鳥類、蝙蝠及臺灣獼猴等潛在內食傳播者的活動範圍重疊，推測在島內主要依賴內生散布，並輔以天然下種維持族群更新。國外將本種應用於退汗、抗發炎及果膠食用；臺灣僅有媒體提及其果膠可作天然黏著劑，尚無民俗利用紀錄。歷史文獻與舊標本均無本種記載，現存族群又多鄰近農園且已出現野外自然更新，推測其於近十餘年間由園藝逸出後進入初期歸化階段，這些觀察符合Blackburn et al. 歸化準則之C3級，顯示該物種已屬於新歸化種，而未達入侵狀態。

## 結論

齒葉破布木已在臺灣西南部低海拔形成可自我更新之族群，其現階段分布侷限原因，可能同時受限於動物內傳播距離及熱帶季乾氣候帶範圍。然而，本種結果量大、根蘖及萌芽能力強，具潛在擴散風險。建議建立長期監測與通報機制，特別關注是否向較濕潤、較高海拔或高緯度區域擴張，以便及早管理。

**關鍵詞：**破布木屬、紫草科、新歸化、臺灣

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