

SOME NOTEWORTHY PLANTS FOUND IN TAIWAN<sup>(2)</sup>CHIEN-CHANG HSU (許建昌)<sup>(1)</sup>

**Abstract:** Of the 16 plants mentioned in this article, 14 species appear as newly recorded or recently naturalized to the weed flora of Taiwan. They belong to 8 families and 13 genera, of which 5 species are the members of the Aster family. The Najadaceae has been reinvestigated. A Chinese name is given for each species and 4 detailed line drawings are presented.

## I. INTRODUCTION

In the course of our studies on the chromosomes of the vascular plants of Taiwan (Hsu, 1967a, '68, '70b, '71c, '72), an extensive collection has been made during the past six years. Some of these materials have been partly studied and the preliminary results appeared in several published papers (Hsu, 1967b, '69, '70a, '71a, '71b, '71c, '71d). More of them are now under investigation by a team working on the "Flora of Taiwan" project.

In this article recently naturalized and newly recorded plants to the flora of Taiwan are introduced. In many cases they have become so widely distributed and common, both in cultivated fields and around villages, that they should be added to the weed flora of this Island. This includes two plants escaped from cultivation, namely *Gaillardia pulchella* and *Plumbago zeylanica*. The former is widely found in the littoral parts of the Pescadores and the northern costal region of Taiwan, while the latter is frequently found around villages.

Of the 16 plants mentioned, 14 species belong to the weed flora of Taiwan and are reported for the first time. They are: *Gomphrena celosioides*, *Coronopus didymus*, *Cuphea carthagensis*, *Borreria latifolia*, *Borreria laevis*, *Ambrosia elatior*, *Galinsoga parviflora*, *Senecio vulgaris*, *Solidago altissima*, *Najus marina*, *Najus minor*, *Najus indica*, *Panicum dichotomiflorum*, and *Paspalum virgatum*. An attempt has been made to give each species a Chinese name and a detailed line drawing unless they have been published on Taiwan materials (Figs. 1-4).

An aquatic monocotyledonous weed genus *Najus* has been thoroughly reinvestigated using fresh materials. Formerly only one species *N. graminea* was reported on this Island, (Masamune 1936/'54). However, three more species, *N. marina*, *N. minor* and *N. indica* are now known from Taiwan. Two more grasses have newly been found as naturalized plants, the one *Panicum dichotomiflorum* is found at the elevation of about 1,900 m at Li-shan, and the other *Paspalum virgatum*, is growing around Nan-kang.

## II. SYSTEMATIC NOTES

1. *Gomphrena celosioides* Mart. in Nov. Act. Nat. Cur. 13: 301. 1826; Backer, Fl. Java 1: 239. 1963. 假青葙 (H). (Amaranthaceae)

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No species of *Gomphrena* has been previously reported except for horticulturally cultivated species. This newly naturalized plant is a perennial weed with branched and prostrate stems. It has become popular, numerous individuals occur in the southern parts of Taiwan, especially south of Taichung. It is a native of Brazil, but is also generally found in tropical countries.

The plant body is covered with long white woolly hairs; the white colored spikes are sessile. The bracteoles outside the tepals have a dorsal crest just below the top.

**Taichung:** City, *Kuoh* 1508; Ta-tu-shan, *Hsu* 10769; **Tainan:** City, *Hsu* 13642; **Pingtung:** City, *Hsu* 9275.

2. *Coronopus didymus* Smith, Fl. Brit. 2: 691, 1800; Osada *et al.*, Ill. Natur. Pl. Fukuoka Pref. 164, f. 77. 1967; Hatusima, Fl. Ryukyus 297, 1971; Osada, Ill. Jap. Alien. Pl. 138, f. 285. 1972. 臭薺 (Cruciferae)

Plate 1

*Senebiera pinnatifida* DC.; *Senebiera didyma* Pers.

This weed is native to Europe, but now is widely distributed in the warmer parts of the world. I saw it growing abundantly in the Pescadores.

It is characterized by the kidney-shaped compressed fruits, whose surfaces are reticulate. It is sparingly covered with multicellular white hairs on the stem. The related species *C. wrightii* Hara (= *Senebiera integrifolia* DC.) has been reported from Green Island and Orchid Island. They can be separated by the following key:

1. Leaves pinnatifid; plant body with an unpleasant smell ..... *C. didymus*  
 1. Leaves serrate to nearly entire; no unpleasant smell ..... *C. wrightii*

**Tainan Co.:** Hsin-hua, *Hsu* 13655A; **Penghu Co.:** Ma-kung, *Kuoh* 2501, Shi-yu, *Hsu* 14041.

3. *Cuphea cartagenensis* (Jacq.) Macbrids in Publ. Field Mus. Nat. Hist. Chicago Bot. Ser. 8: 124. 1930; Hatusima, Fl. Ryukyus, 428. 1971. 克非亞草 (H) (Lythraceae)

*Lythrum carthagenensis* Jacq.; *Cuphea balsamona* Cham. et Schl., Backer, Fl. Java 1: 254. 1963.

This newly naturalized weed has a sticky calyx-tube covered with glandular hairs, thus attaching easily to animals which aid in its rapid dispersal. It was probably naturalized after the World War II, but now is one of the common troublesome weeds throughout the Island. It is a native of tropical America, probably Brazil.

This is a prostrate annual weed with glandular, much branched stems. The leaves are opposite or occasionally one side is reduced, making it look as if alternate, elliptical, scabrous, with 4-5-side veins. Flowers are pink, axillary and single. The calyx-tubes are tubular, 8-ridged with 6-teeth, about 5 mm long.

**Hlan:** Lo-tung, *Kuoh* 1724; **Taipei:** Ping-lin, *Chang* 1190; Ying-ho-tung, *Kao* 6626, *Chuang* 4643, *Cheng* 1584; **Nantou:** Ho-sho, *Huang* 4055; **Kaohsiung:** Chia-hsien, *Chuang* 4745, San-ping, *Huang* 4960, Liou-kuei, *Hsu* 5058; Teng-chih, *Hsu* 13701A; **Pingtung:** Nan-jen-shan *Huang* 4868.

4. *Plumbago zeylanica* Linn., Sp. Pl. ed. 1. 151. 1753; Backer, Fl. Java 2: 444. 1965. (Plumbaginaceae) 白花丹 (烏面馬).

This is a medicinal plant frequently used by the local peoples. It is now growing here and there around the villages.

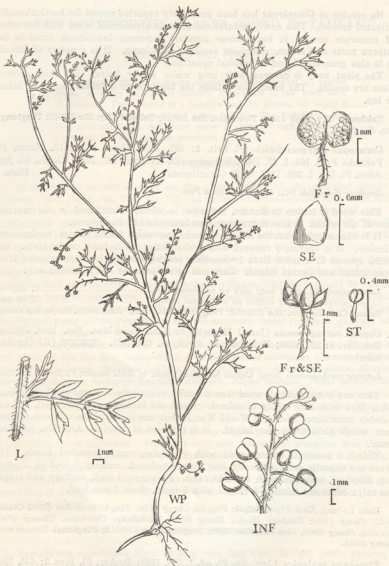


Plate 1. *Coronopus didymus* Smith *Hsu 14041* (TAI). Fr: A fruit; Fr & SE: Fr & SE: An ovary and calyx; INF: A part of inflorescence; L: A leaf; SE: A sepal; ST: A stamen; WP: A part of plant body.

**Taipei:** Tam-sui, *Hsu 11236*; **Hsinchu:** Hsin-pu (Sinpo) S. Sasaki s. n., Oct. 10, 1913; **Ann-Taichung:** Ta tu shan, *Hsu 10763*; **Chiayi:** Chia-yl, *Matuda* s. n. May 1919; **Tainan:** ping, *Hsu 5024*; **Pingtung:** Ken-ting, *Kuo 2133*.

5. *Borreria latifolia* K. Schum in Mart., Fl. Bras. 6: 61. 1888; Backer, Fl. Java 2: 354. 1965. (Rubiaceae) 潤葉破得力 (H.)

This troublesome weed is native to tropical America. It becomes one of the common weeds in banana plantations, waste fields, dykes and tea-gardens. The stems are easily broken even by a finger touch, thus it propagates very rapidly. The 4-winged stems and broad, ovate-oblong, yellow-green leaves are the most characteristic feature of this species.

**Taipei:** Ta-tung-shan, *Hsu 6407*, San-hsia, *Ito* s. n. Aug. 1942; **Miaoli:** Hou-lung, *Kao 7368*; San-yl, *Huang 4826*; Tsuo-lan, *Kao 7391*; **Nantou:** Chu-shan, *Huang 4041*; Pull. *Hsu 4601 et 4690*.

6. *Borreria laevia* (Lamk.) Grieseb. in Goett. Abh. 8: 231. 1857; Backer, Fl. Java 2: 352. 1965; Hatusima, Fl. Ryukyus 852. 1971. (Rubiaceae) 小破得力 (H) **Plate 2**  
*B. acymoides* (Burm. f.) DC.

This delicate weed is widely naturalized in the tropical regions of Asia, Micronesia and Africa. It seems to be growing only in the southern parts of Taiwan.

The plant is glabrous, prostrate and branched at the very base. The leaves are oblong-lanceolate and bear minute, white flowers in the leaf axils. It has a deeply lobed corolla of about 1 mm long.

**Kaohsiung:** San-ping, *Kao 7453*; Chi-shan, *Hsu 6498*.

The Formosan *Borreria* species are separated as follows:

1. Stems weak, less than 20 cm long, glabrous; leaves oblong-lanceolate; corolla about 1 mm long ..... *B. laevia* (*B. acymoides*)
1. Stems stout more than 30 cm long, pubescent to hispid; corolla more than 5 mm long .... 2
2. Leaves linear to obovate-lanceolate, less than 1 cm wide ..... *B. articularis* (*B. hispidus*)
2. Leaves ovate-oblong, more than 2 cm wide ..... *B. latifolia*

7. *Ambrosia elatior* Linn., Sp. Pl. ed. 1. 987. 1753; Hatusima, Fl. Ryukyus 600. 1971. (Compositae) 艾葉齒果菊 (H)

*Ambrosia artemisiifolia* Linn.; Osada, Ill. Jap. Alien Pl. 3, f. 5. 1972.

This is one of the weeds native to North America, but it has become quite widely distributed in the warmer parts of the world. I saw it covering a large area in the Shih-men (石門) district, and this may migrate to the waste fields all over the Island.

The leaves are generally deeply pinnatifid to lobed. The staminate heads are directed downwards and arranged on the upper part of the terminal raceme. A few pistillate heads are arranged on the lower part of the raceme. The involucre and the achenes unit into a hard false fruit with several wart-like papillae.

**Taipei:** Shih-men, *Hsu 10851*; **Nantou:** Wu-she, *Kuo 2788*.

8. *Gaillardia pulchella* Fougier in Mem. Acad. So. Par. 1786: 5. 1788; Hatusima, Fl. Ryukyus 631. 1971. (Compositae) 天人菊

This beautiful flower was originally introduced from N. America and cultivated as a cut-flower, but it has escaped from cultivation and is one of the naturalized plants in the littoral parts of Taiwan and the Pescadores.

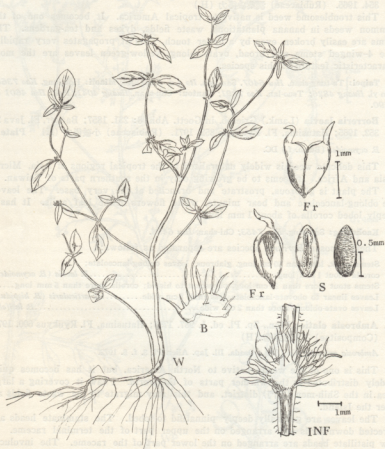


Plate 2. *Borreria laevis* (Lamk.) Grieseb. Hsu 6498 (TAI). Fr: A fruit; Inf: An inflorescence; S: Seeds; W: Plant body; B: Stipule.

It is an annual herb with heads of 3-5 cm across. The plant body is covered with multicellular hairs. The heads terminate a long scape. It has about 10-20 ligulate flowers.

Taipei: Shih-men Hsu 10853

9. *Galingsoga parviflora* Cavanilles, Icones et Descript. Pl. 3: 41, t. 281. 1794; Kitamura in Act. Phytotax. et Geobot. 1: 265. 1932 et l.c. 20: 179. 1962.  
(Compositae) 小米菊 (Jap.)

This weak annual weed is a native of tropical America. It was found around the University Farm and I also saw it growing in the Ta-chih district around cultivated fields. According to Kitamura (1962) this weed is similar to *G. ciliata*, but can be separated from it by much reduced bristle-like pappus on the ligulate flowers. It is reported also naturalized in Japan, Manchuria and from Tibet.

The leaves are opposite, ovate to ovate-lanceolate, 3-veined, and sparingly serrate. The involucre is semi-globose with 5 white ligulate flowers. The pappus of the tubular flowers are not awn-like, and the pappus is reduced on the ligulate flowers.

Taipei: N. T. U. Farm, Hsu 9287; Kuo 2888.

10. *Senecio vulgaris* Linn., Sp. Pl. ed. 1. 867. 1753; Osada, Ill. Natural. Pl. Fukuoka Pref. 76. 1967. (Compositae) 歐洲千里光 (H)

This somewhat juicy weed is native to Europe, but is distributed in temperate countries. It is found around the villages located at the elevations between 1,000 m and 3,000 m. It seems to bloom all the year around.

The leaves are pinnately divided, and involucre bracts are uniformly with dark upper-half; it reflexing after flowering. The achenes are cylindrical and pubescent.

Taichung: Ching-shan Bus Station, Hsu 13315; Li-shan alt. 1, 400 m, Hsu 6975; Mt. Hohuan, Huang 4644. Hualien: Ta-yu-ling, Chuang & Kao 4422, Kuo et al. 8575.

11. *Solidago altissima* Linn., Sp. Pl. ed. 1. 878. 1753; Hatusima, Fl. Ryukyus 625. 1971; Osada, Ill. Jap. Alien Pl. 41, f. 82. 1972. (Compositae) 北美一枝黃花 (H)

Probably this was naturalized after World War II. I saw it growing on the University Campus in 1960. It is occasionally found in the northern part of Taiwan, but it has been reported growing gregariously as one of the most dominant plants in Ryukyus and Japan.

This is a native of N. America. It is a tall perennial of about 2 m high. The leaves are nearly sessile, 3-veined, lanceolate and scabrous, sparingly serrate on margins. The panicles are large, and the yellow-flowered heads are arranged on the upper side of the branches.

Taipei: N. T. U. Campus, Chuang 2990; Li-ho-li, Hsu et Hsieh 11256.

12. *Najas marina* Linn., Sp. Pl. ed. 1. 1015. 1753; Hatusima, Fl. Ryukyus 647, 1971. (Najadaceae) 蔞華茨藻 (H)

*Najas major* All.

This is an aquatic weed submerged in shallow waters. It is characterized by rather broad leaves of about 2-3 mm wide. This was found the first time at Chen-chin-hu (澄清湖) by Mr. Y.P. Yang (楊連波).

Submerged herbs; stem much branched, glabrous or sometimes sparingly spinulose, rooting at the lower nodes; Leaves flat, 2-3 m wide, apex obtuse, margins remotely 6-9-toothed; sheaths entire, as broad as the leaf blade; auricle wanting; flowers light green, unisexual, dioecious; the female flowers solitary, espathate; stigmas 2-3-cleft; seeds somewhat asymmetrical, oblong-obate, about 3 mm long by 1.5 mm wide, the areolae elongated, irregular.

**Kaohsiung:** Chen-chin-hu, *Yang* 39.

The Chinese name is proposed and is dedicated to my teacher Prof. Dr. Charles E. DeVol (棟莖華) his name indicates his love for China and he shall retire from the Department of Botany at the end of July, 1973.

#### KEY TO THE TAIWAN SPECIES OF *NAJUS*:

1. Leaves broader, 2-3 mm wide, spined on backside, tip of leaf-sheath entire.....*N. marina*
1. Leaves narrower, less than 1 mm wide, not spined on back; tip of leaf-sheath spinulose.....2
2. Leaf margins finely serrulate (with more than 40 teeth on a side); sheath mouth auriculate.....*N. graminea*
2. Leaf margins serrate (with less than 20 teeth at one side); sheath mouth not auriculate.....3
3. Areolae of seed transversely elongated, ladder-like; leaves usually recurved.....*N. minor*
3. Areolae of seed hexagonal to quadrate.....*N. indica*

#### 13. *Najus minor* Allione, Fl. Ped. 2: 221. 1985; Hatusima, Fl. Ryukyus 647. 1971 (Najadaceae) 棟氏莖華 (H) Plate 3

Formerly this species was much confused with *N. graminea*, and was identified as the latter but it can easily be separated from the latter by its ladder-like areolae on the seed surface. It is distributed commonly in Japan, Ryukyus, the Philippines, Malaysia and Java to India.

The stems are numerous branched; leaves recurved, 1-2.5 cm long by 0.5-0.8 mm wide, apex acute to obtuse, margins conspicuously 10-13-toothed; basal sheath 2-3 mm long by 1.4-2.5 mm wide, auricle spiny, truncate to rounded; flowers unisexual, male flower solitary, enclosed in a spathe, anther 1-celled, elliptical, about 1.5 mm long by 0.25 mm wide; female flower mostly solitary, espathate, stigma 2-cleft; seeds narrowly elliptical, slightly curved, 0.5-2.8 mm long by 0.5-0.8 mm wide, areolae transversely elongate.

The Chinese name is dedicated to Prof. Dr. Charles E. DeVol.

Locally this species has been collected from Taipei Co., Nantou Co., Kaohsiung Co., Pingtung Co., and Ilan Co.

**Taoyuen:** Shih-men Dum, *Yang* 62.

#### 14. *Najus indica* (Willd.) Cham. in Linnæa 4: 501. 1829; Hatusima, Fl. Ryukyus 647. 1971. (Najadaceae) 印度莖華 (H) Plate 4

This newly recorded aquatic weed is characterized by the areolae on the seed being hexagonal in shape.

Stems are up to 1 m long, numerous branched; leaves straight or slightly recurved 1.5-2.5 cm long by 0.5-2.2 mm wide, auricle 0.2-0.4 mm long, 5-9-toothed on upper margin; male flowers mostly solitary, enclosed in a spathe of 3 mm long by 2 mm wide, anther 4-celled; female flowers espathate, stigmas 2; seeds cylindrical 1.5-2 mm long by 0.5-2.5 mm wide with quadrate to hexagonal areolae.

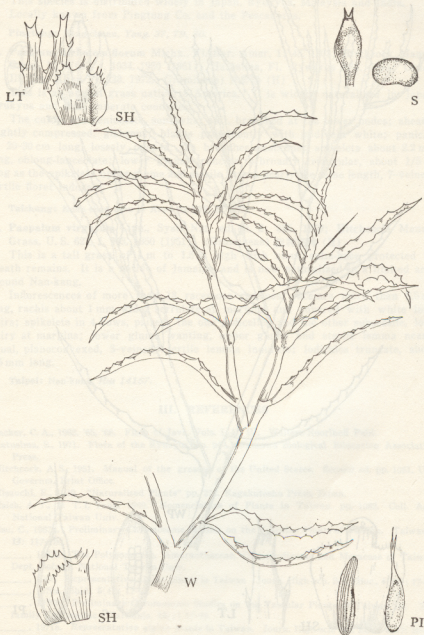


Plate 3. *Najas minor* Allione Y.P. Yang 62 (TAI). LT: A leaf-apex; PI: A Pistil; S: A seed; SH: A leaf-sheath; WP: A part of plant body.



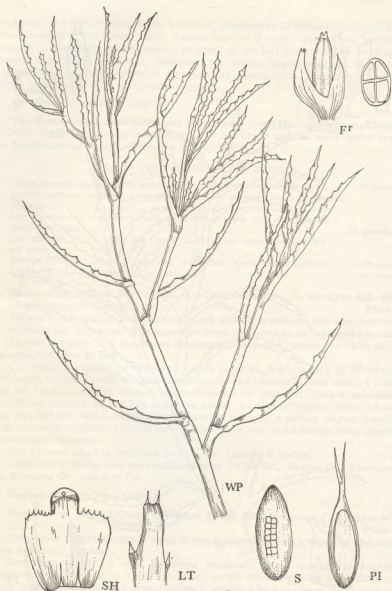


Plate 4. *Najus indica* (Willd.) Cham. Y.P. Yang 37 (TAI). Fr: A fruit; LT: A leaf-apex; PI: A pistil; S: A seed; SH: A leaf-sheath; WP: A part of plant body.

This species is distributed widely in Japan, Ryukyus, Malaysia and India. Locally known from Pingtung Co. and the Pescadores.

**Pingtung:** Heng-chunn, *Yang*, 37, 79, 80.

15. *Panicum dichotomiflorum* Michx., Fl. Bor. Amer. 1: 48. 1803; Hitchcock, Manual Grass, U. S. 685, f. 1034. 1950 (1951); Hatusima, Fl. Ryukyus 684. 1971; Osada, Ill. Jap. Alien Pl. 228. 1972. Gramineae) 洋野黍 (H)

This is an annual grass native to America. It is widely naturalized in Japan, Ryukyus and the temperate countries.

The culms are geniculate, somewhat soft, branched at the lower nodes; sheaths slightly compressed, glabrous; blades prominently with mid-vein white; panicles of 20-30 cm long, loosely opened, the branches scabrous; spikelets about 2.2 mm long, oblong-lanceolate; lower glume truncate to broadly triangular, about 1/5 as long as the spikelet; upper glume and sterile lemma nearly the same length, 7-veined; fertile floret indurate.

**Taichung:** Kuan-shan, *Hsu et Kuoh* 80129, 80121.

16. *Paspalum virgatum* Linn., Syst. Nat. ed. 10. 2: 855. 1759; Hitchcock, Manual Grass, U. S. 621, f. 903. 1950 (1951). (Gramineae) 粗稈雀稗 (H)

This is a tall grass of 1 m to 1.5 m high with stout culm-base protected by sheath remains. It is a native of Jamaica, and is now naturalized in a limited area around Nan-kang.

Inflorescences of more than 18 racemose racemes, racemes more than 5.5 cm long, rachis about 1 mm wide, serrulate at margins and covered with white long hairs; spikelets in 4 rows, paired, the one pedicelled and the other sessile, long hairy at margins; lower glume wanting, upper glume and sterile lemma nearly equal, planoconvex, 3-veined; fertile lemma indurate; lodicules truncate, about 0.6 mm long.

**Taipei:** Nan-kang, *Hsu* 14157.

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