

## A NEW SPECIES OF PAULOWNIA FROM TAIWAN— *P. TAIWANIANA* HU & CHANG

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**Abstract:** A native taxon of *Paulownia* intermediate between *P. fortunei* and *P. kawakamii* has been known for some years and has been introduced into Indonesia and South America where it is being widely cultivated, but it does not have a scientific name and has never been published in any scientific journal. This taxon is now being named *P. taiwaniana* Hu et Chang.

### INTRODUCTION

The earliest record of the genus *Paulownia* in Taiwan is found in Kawakami's "A List of Plants of Formosa" (1910). At that time, he did not give a specific name to the specimens which he had collected. After two years, in 1912, Tokutaro Ito described the specimens of *Palouwenia* collected by Kawakami from Hsinchu (新竹) and named it *Paulownia kawakamii*, he also described another species collected from Nantou (南投) and named it *P. mikado* (Ito, 1912). The latter is now treated by most authors as *P. fortunei*. We have checked all the taxonomic literature, and have only found these two native species to be reported from Taiwan. (Sasaki, 1928; Masamune, 1936; Kanehira, 1936; Chen, 1937; S. Y. Hu, 1961; Li, 1971; T. S. Liu, 1960; Y. C. Liu, 1970, 1972)

In the past decade the excellent properties of *Paulownia* lumber has caused the price of *Paulownia* wood to become very expensive and so now *Paulownia* is a very good cash crop. This situation has stimulated the staff of the Taiwan Forestry Research Institute to work together as a team on the research of this species. For the Provenance and Progeny tests, collections of specimens were made from more than 30 localities involving more than 100 trees. Through critical observation on the flowers, fruits, seeds, flowering twigs and leaves, we discovered a new population which possesses intermediate characteristics between *P. kawakamii* and *P. fortunei*. We have searched in vain for a name for this new taxon. However in "Colored Illustrations of Important Trees in Taiwan" (Y. C. Liu 1970) and "Woody Flora of Taiwan" (H. L. Li 1971), there are colored photographs and line-drawings of this new taxon, and in each case, they are under the name of *Paulownia kawakamii*. As far back as 1920, a silviculturist, Y. S. Lai (賴雲祥) reported that he had found a new *Paulownia* growing wild at an elevation of 600 m. in Miaoli (苗栗). He called the thin-leaved *Paulownia* because its leaves are thinner than those of *P. kawakamii*. He also described this species in several papers (Lai 1928, 1932 and 1938). From his detailed descriptions and from the trees planted by him, we can see that his thin-leaved *Paulownia* is the same as our new taxon; unfortunately he did not leave a type specimen nor give a formal publication of this taxon. Because of its fast growth rate as well as its adaptability to warm weather, it is not only widely cultivated in Taiwan but also has been introduced into South America and Indonesia.

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It is necessary to give this species an appropriate scientific name. It is commonly called Taiwan paulownia and its timber is also commercially called Taiwan paulownia. Therefore, we are giving this species the name *Paulownia taiwaniana*.

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### DESCRIPTION

***Paulownia taiwaniana*** Hu et Chang, sp. nov. (臺灣泡桐).

Arbor decidua, circiter 20 m. alta; ramis teretis, hornotinis 5-12 cm. diametro; lenticellis orbicularibus vel elliptis; foliis latoovatis, 10-30 cm. longis, 8-30 cm. latis, integris vel 3-5 lobatis, basi cordatis, apice acutis vel acuminatis, chartaceis, peticulis 10-17 cm. longis, supra sparse pilosis, pilis glandularibus, subtus dense tomentosis, pilis glandularibus capillaribus, basi glandularibus punctatis. Inflorescentiis pyramidalibus, terminalis; Cymis 3-5-floribus, Pedunculis 5 mm. longis, Pedicellis 8-15 mm. longis, stellatopilosis; Calycibus campanulatis, 1-1.5 cm. longis, 1 cm. latis, 5-lobatus, lobis deltoideis, dense stellato-pilosis; Corollis infundibulo-campanulatis pallido-violaceis, 6.5-7 cm. longis, intus obscurus violaceo-maculatis, in fauces subtus ovm 2 carinas fusco-flavis, extus stellato-pilosis et glandulosis, staminibus didynamis, filamentis basi compressis et contortis, glandulosis-pilosis, antheris biloculatis, thecis divergentibus; ovari oblong-ovoideis, Stylo 4 cm. longo; Stigmatibus Suburceolate. Capsulis lignosis, oblongo-ovoideis, apice rostratis, 3.4-4.5 cm. longis, 2 cm. latis. Calycibus persistetibus subinfundibulis, seminibus alis inclusis 5.5 mm. longis, 3-3.5 mm. latis.

A deciduous tree up to 20 m. high, branchlets terete, glabrescent, the current year's growth 5-12 mm. in diameter, lenticels suborbicular or elliptic. Leaves opposite, the leaf-scars suborbicular, the leaf-trace V-shaped; mature leaves entire, chartaceous, broadly ovate, 10-30 cm. long, 8-30 cm. wide, the base cordate, the apex acute or abruptly acuminate, glabrescent above with few glandular hairs, moderately tomentose with dendroid hairs beneath; petioles 10-17 cm. long, furfuraceous and glabrescent; young leaves at anthesis glandular-hispid and with multicellular disk-like glands sparingly scattered near the base. Inflorescences paniculate; terminal, individual cymes simple or dichotomously branched, 3-5-flowered; peduncles of the cymes 5 mm. long, pedicels 8-15 mm. long, brown lanate with dendroid hairs, flowers fragrant, calyx campanulate 1-1.5 cm. long, 1 cm. across the middle, 5-lobed, 1/3 divided, grey-brown, the lobes deltoid, 4-6 mm. long, 4 mm. wide, lanate, with dendroid hairs. Corolla infundibulo-campanulate light purple, the inside with deep violet specks, yellow on the throat, 6.5 cm. long, 2 cm. across the middle, and 6 cm. across the limb, the outside dendroid-pubescent and glandulose-papillose; limb 5-lobed, the lobes round, dendroid pilose; stamens didynamous; filaments compressed, twisted and geniculate at the base, the longer pair 3.5 cm. long, and shorter pair 2.5 cm. long; anther white, 5-8 mm. long, 2-locular, opening lengthwise; style 4 cm. long; ovary oblong-ovoid, glandular-papillose; Stigma terminal, truncate, cup-shaped. Capsules ovid, 3.5-4.5 cm. long, 2 cm. across; pericarp woody; persistent calyx subinfundibuliform, rugose, furfuraceous. Seeds including the wings 5-5.5 mm. long, 3-3.5 mm. wide.

**MIAOLI:** Erhpsung (二本松), T. W. Hsü s. n. (Oct. 1973); H. J. Chang 2354. **TAICHUNG:** Kukuan (苦關), H. J. Chang 2353. **NATOU:** Washe (霧社), H. J. Chang 2362. **CHIAIYI:**

Table 1. Morphological characteristics of the *Paulownia* native to Taiwan

Scientific name	<i>P. kawakamii</i> (Sect. <i>Kawakamii</i> )	<i>P. taiwanensis</i> (Sect. <i>Paulownia</i> )	<i>P. fortunei</i> (Sect. <i>Fortuniana</i> )
Characteristics			
Flowering twig	pyramidal with gradually smaller side branches	pyramidal with gradually smaller side branches	nearly cylindrical, side branches poorly developed
Inflorescence	cymes subsessile or umbelliform	cymes with conspicuous peduncles	cymes with conspicuous peduncles
Calyx	5-lobed, 2/3 divided, persistent calyx rotate, much reflexed	5-lobed, 1/3 divided, persistent calyx infundibular, sometimes reflexed	5-lobed, 1/3 divided, persistent calyx infundibular, sometimes reflexed
Corolla	3.5-4cm. long, white or pale lilac, throat yellow with 2 keels and purple straight lines	5-6cm. long, light purple throat yellow with 2 keels and deep purple spots	7-9cm. long, pale lilac, throat yellow with deep spots and a purple brown band in the center
Fruit	2.5-3.5cm long, globose-ovate pericarp coriaceous, very thin	3-4.5cm. long globose-ovate to ovate pericarp woody, thicker than <i>P. fortunei</i>	5-8cm. long oblong-ellipsoid pericarp woody, thick
Seed	seed black, wing grey including the wing 2.0-3.0mm. long, 2.0mm. wide	seed black, wing white including the wing 5-5.5mm. long, 3-3.5mm. wide	seed black, wing white including the wing 5-5.5mm. long, 3-3.5mm. wide
mature leaves	capitate glandular hairs and dendroid hairs	a few capitate glandular hairs, and dendroid hairs	dendroid hairs
Indumentum	calyx	dendroid hairs yellow brown	dendroid hairs grey brown
corolla	capitate glandular hairs	capitate glandular hairs and dendroid hairs	dendroid hairs

\*----&gt;Showing the similarity between species.

Chiaolping (交力坪), *T. W. Hu* s. n., Oct., 1973; *H. J. Chang & S. Y. Lu* 2364 (holotype, TAIF; isotype, A)

The authors suggest that Taiwan paulownia may be a natural hybrid between *P. kawakamii* and *P. fortunei*; the tree was introduced into Argentina in 1956. The foresters there consider it a hybrid and call it the "Hybrid paulownia", (Mangieri 1971). Its subinfundibular corolla, obconic calyx, pedunculate inflorescence all suggest a close relationship with *P. fortunei*. Its pyramidal flowering twigs, corolla color and spotted pattern inside the tube, and hair texture of its leaves are all related to *P. kawakamii*. Thus it is usually misidentified as *P. fortunei* or *P. kawakamii*. As to the flowering twigs, they are very similar to *P. tomentosa*. According to S. Y. Hu (1961), this new species should belong to Sect. Paulownia (see table 1).

Key to the species of *Paulownia* native to Taiwan

1. Capsules oblong-ellipsoid, 5-7 cm. in length, pericarp woody.....*P. fortunei*
1. Capsules elliptic-ovate to globose-ovate, 2.5-4 cm. in length
  2. calyx rotate, 2/3 divided, persistent calyx much reflexed.....*P. kawakamii*
  2. calyx obconic, 1/3 divided, persistent calyx infundibular .....*P. taiwaniana*

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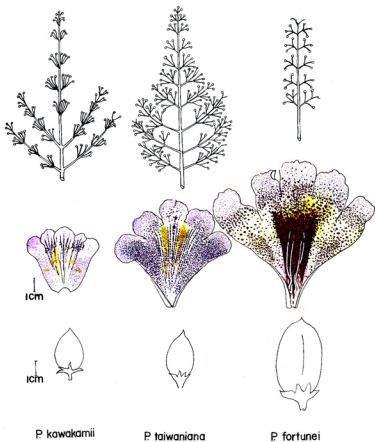


Plate I. Comparisons of three morphological characters among 3 native *Paulownia* spp. upper, flowering twigs; middle, corolla opened; bottom, capsules.

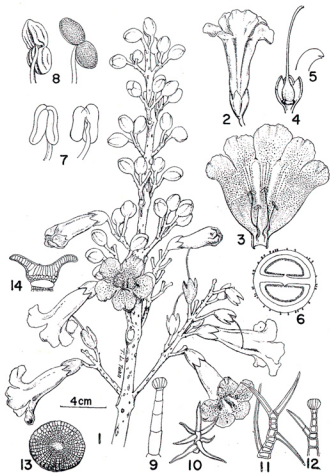


Plate II. *Passiflora taiwanica* 1. Flowering twig. 2. Flower. 3. Flower opened to show the insertion of stamens and spot patterns. 4. ovary. 5. stigma. 6. transverse section of ovary. 7. 8. stemens. 9. 10. 11. 12. varies kinds of hairs from flowers and leaves. 13. Disk-like gland. 14. transverse section of the same.

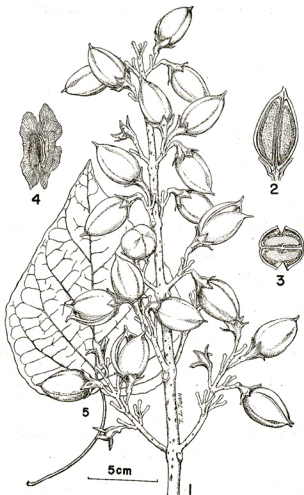


Plate III. *Paulownia taiwaniana* 1. Fruiting twig. 2. longitudinal section of the capsule. 3. transverse section of the same. 4. Seed. 5. leaf.