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Correspondence on editorial matters and subscriptions for Reinwardtia should be addressed to:

HERBARIUM BOGORIENSE, BOTANY DIVISION,

RESEARCH CENTER FOR BIOLOGY– INDONESIAN INSTITUTE OF SCIENCES

CIBINONG SCIENCE CENTER, JLN. RAYA JAKARTA – BOGOR KM 46,

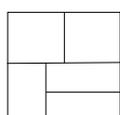
CIBINONG 16911, P.O. Box 25 CIBINONG

INDONESIA

PHONE (+62) 21 8765066; Fax (+62) 21 8765062

E-MAIL: reinwardtia@mail.lipi.go.id

<http://e-journal.biologi.lipi.go.id/index.php/reinwardtia>



Cover images: *Begonia mattampensis* Ardi & D.C.Thomas *spec. nov.* (§ *Petermannia*).
Top left: Habit. Top right: Stipules. Below left: Male inflorescence. Middle: Male flower & female flower. Below right: Fruit & ovary cross section (middle part). Photos: W.H. Ardi.

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Barry J. Conn, School of Life and Environmental Sciences, The University of Sydney, Australia

Michele Rodda, Singapore Botanic Gardens, Singapore

Mark Newman, Royal Botanic Garden Edinburgh, United Kingdom

***HOYA DECIPULAE* (APOCYNACEAE, *ASCLEPIADOIDEAE*), A NEW SPECIES FROM SUMATRA**

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SRI RAHAYU

*Center for Plant Conservation, Bogor Botanic Gardens-LIPI, Jln. Ir. H. Juanda No. 13, Bogor. 16122, Indonesia.
Email: srir002@lipi.go.id; srirahayukrb@yahoo.com*

INGGIT PUJI ASTUTI

*Center for Plant Conservation, Bogor Botanic Gardens-LIPI, Jln. Ir. H. Juanda No. 13, Bogor. 16122, Indonesia.
Email: ingg001@lipi.go.id; inggit.pa@gmail.com*

ABSTRACT

RAHAYU, S. & ASTUTI, I. P. 2018. *Hoya decipulae* (Apocynaceae, *Asclepiadoideae*), a new species from Sumatra. *Reinwardtia* 18(1): 43–50. — The new *Hoya* species from Sumatra, *Hoya decipulae* S.Rahayu & Astuti is here described and illustrated. It is an epiphytic shrub, thin-leaved with white flowers, similar to those of *H. papaschonii* Rodda, but differs in corolla and corona form. Its corolla has a unique characteristic of forming a “cage” before fully opening, as a result of the attachment of the five corolla tips which are free at the centre. The corona does not have interstaminal lobes as in *Hoya papaschonii*. Its corona resembles that of *H. multiflora* Blume and *H. irisae* Ferreras, Kloppenburg & Tandang from the centre to the tip but differs at the base.

Key words: Cage flowered *Hoya*, Epiphyte, Indonesia, non-succulent, thin leaved *Hoya*

ABSTRAK

RAHAYU, S. & ASTUTI, I. P. 2018. *Hoya decipulae* (Apocynaceae, *Asclepiadoideae*), satu jenis baru dari Sumatera. *Reinwardtia* 18(1): 43–50. — *Hoya* jenis baru dari Sumatera yaitu *Hoya decipulae* S.Rahayu & Astuti dipertelakan dan diilustrasikan dalam makalah ini. Jenis ini merupakan terna epifit berdaun tipis (non sukulen) dengan bunga berwarna putih yang mirip dengan *H. papaschonii* Rodda, namun memiliki perbedaan pada bentuk mahkota dan korona. Mahkota bunga memiliki karakter yang unik karena membentuk seperti kurungan saat hendak mekar. Bentuk kurungan tersebut terbentuk karena helai mahkota saling berlepasan pada bagian tengah, namun masih tetap berlekatan pada bagian ujung. Korona pada *H. papaschonii* memiliki “interstaminal lobes” yang tidak terdapat pada *H. decipulae*. Bentuk koronanya menyerupai korona pada *H. multiflora* Blume dan *H. irisae* Ferreras, Kloppenburg & Tandang pada bagian tengah hingga ujung namun berbeda pada bagian pangkal.

Kata Kunci: Epifit, *Hoya* berbunga bentuk kurungan, *Hoya* berdaun tipis, Indonesia, non sukulen.

INTRODUCTION

Hoya R.Br. is an interesting genus from the family Apocynaceae *sensu lato*, subfamily *Asclepiadoideae* (Endress & Bruyns, 2000; Endress *et al.*, 2014). It comprises about 350–450 species of mostly epiphytic climbers (Lamb & Rodda, 2016). The primary distribution is in the Indomalayan-Australasian region (Lamb & Rodda, 2016). Some species are also found in India and Sri Lanka, the Himalayan foothills, southern China and Japan (Forster *et al.*, 1998). Hoyas are becoming increasingly popular among hobbyists as ornamental plants, first in Europe and America and now also in Asian countries. Hoyas are a good choice as indoor ornamental plants as they may have the ability to remove indoor pollutants. Research screening of 28 indoor ornamental plants on their ability to remove five volatile indoor pollutants was done by Yang *et al.* (2009), and showed that *Hoya carnosa* (L.) R. Brown and another four indoor

plant species had the highest removal efficiencies for all pollutants. Several *Hoya* species are also reported to have medicinal properties (Zachos, 2005; Rahayu, 2011a), however studies on the uses of *Hoya* as source of modern drugs are yet to be reported.

Indonesia has the widest natural distribution of *Hoya* and is also predicted to have the highest species diversity of *Hoya* in the world (Kleijn & van Donkelaar, 2001). In the Indonesian archipelago, Sumatra is one of the key islands for diversity of *Hoya* and their habitat (Rahayu, 2011b). The island of Sumatra has 41 species and two subspecies of *Hoya* (Rahayu & Rodda, 2019), with most species similar to those of Peninsular Malaysian species as listed by Rintz (1978). The *Hoya* of Sumatra was dominated by epiphytic climbers and succulent-leaved *Hoya* (Rahayu, 2011b). Examples of epiphytic *Hoya* from Sumatra include *H. multiflora* Blume [(section *Centrostemma*) (Blume, 1823; 1826)] which is widely distributed from India to Papua and *H.*

lasiantha Korth. ex Blume (section *Plocostemma*) which is distributed through the Malay Peninsula, Sumatra, Java, and Borneo (Rahayu, 2011b; Rahayu & Wanntorp, 2012). The newly published shrubby and non succulent-leaved *Hoya* i.e. *Hoya ignorata* T.B. Tran, Rodda, Simonsson, Jongku Lee (Tran *et al.*, 2011) also has a wide distribution from Vietnam-Indochina to Malaysia and Borneo. Most shrubby *Hoya* species have non-succulent leaves, with exceptions in some species such as *H. spartiodes* (Benth.) Kloppenb. *Hoya spartiodes* has a shrubby habit. It has herbaceous juvenile leaves which fall during plant development and is leafless as an adult (Albers & Meve, 2002; Kunze & Wanntorp, 2008).

Hoya with non-succulents leaves and a climbing habit are represented by *H. campanulata* Blume (Section *Cystidanthus*). According to the research of Wanntorp *et al.* (2011), *Hoya* with non-succulent leaves were placed in clade III, including those with a climbing habit as well as the shrubby habit, for example *H. multiflora* and *H. campanulata*. An earlier study by Rahayu (2011b) on the relationships between of *Hoya* from Sumatra was based on morphological characteristics and showed the species grouping was based on the type of leaf succulency. In that study, *H. multiflora* was placed in the same clade as *H. lasiantha*, which has similar vegetative characteristics, including non-succulent leaves and a shrubby habit. *H. lasiantha* is morphologically identical to *H. praetorii* but it is yet to be resolved whether they are identical or separate species. In the study by Wanntorp *et al.* (2011), *H. praetorii* was placed in the same clade as *H. multiflora*.

Hoya species with non-succulent leaves and a shrubby habit are still uncommon, perhaps due to their vegetative habit resembling their habitat and mimicking tree branches. They may be identified as *Hoya* species only when flowering. With more intensive exploration, *Hoya* with non-succulent leaves and shrubby habit are more commonly being identified. After the identification and description of *H. ignorata* (Tran *et al.*, 2011), Rodda & Ercole in 2014 described a new species from southern Thailand closely resembling *H. multiflora*, namely *Hoya papaschonii* Rodda. There was initial doubt as to the identification of this species as *Hoya*, due to physical characteristics, however molecular evidence (trnL) confirmed its place in the genus. The species is located (nested) in the *Hoya* clade closest to *H. multiflora* (Rodda & Ercole, 2014). The morphological similarity of *H. papaschonii* to *H. multiflora* was mostly in the vegetative parts such as habit, stem and leaves, while the flower shape is morphologically similar to *H. telosmoides* Omlor. *Hoya telosmoides*, which has non-

succulent leaves, was also placed at the same clade i.e. Clade III (Wanntorp *et al.*, 2011), however it has a climbing habit.

Another recently identified shrubby species with non-succulent leaves is *Hoya irisae* Ferreras, Kloppenburg & Tandang (2014) from the Phillipines, which was not included in Wanntorp *et al.* (2011). This species is vegetatively similar to *H. papaschonii*, but has longer pendulous (hanging) umbels and free, spreading, yellowish corolla. The corolla base is tubular and bulbous as observed in *H. papaschonii*. The white corona lobes are erect and inserted in the corolla tube from the base to the three-quarter mark, stiff and waxy-looking with upper apex touching in the middle.

The recent flora expedition by a Bogor Botanic Gardens team to West Lampung, Sumatra, Indonesia in July 2017 has resulted in a new *Hoya* species similar to *H. papaschonii* and *H. irisae* but differ in some characteristics. The species was then cultivated at Bogor Botanic Gardens and documented as a herbarium type specimen. A detailed observation was conducted to define it as a new species.

MATERIALS AND METHODS

Sample source. The observation was based on plant material cultivated at Bogor Botanic Gardens (BBG living collection accession number B2017080094) from the results of an expedition to West Lampung by Inggit Puji Astuti *et al.*, in July 2017, Coll. no. YI 22171. A herbarium type specimen was made from the same source and stored at BO (holotype) and BOHB (isotype) with the same collection number IPA 1231/2017.

Morphological observation. Descriptions were based on observation of living specimens which flowering frequently in Bogor Botanic Gardens. Direct observation was done on habit, stem, internode, leaves and inflorescences with the aid of simple metric equipment. Inflorescence was observed throughout development in living plants. Fruit ontogeny was not observed, as there was no fruit production during cultivation in Bogor Botanic Gardens, despite frequent flowering. The fruit was observed in the field at the time of collection from a single sample, and was processed as a herbarium type specimen. Dissected flowers were examined with the aid of a light microscope. Pollinaria were extracted and mounted on glass slides prior to microscopic observation. Comparison between the closest species was made by comparing descriptions from published literature. Closest resembling species are *H. papaschonii* and *H. irisae*.

RESULTS

The *Hoya* specimen examined from West Lampung (IPA 1231/2017/BBG living collection accession number B2017080094/expedition collection number YI 22171) was considered sufficiently different from *H. papaschonii* and *H. irisae* in corolla and corona morphology to be published as a new species. This new *Hoya* species is very similar to *H. papaschonii* in vegetative characteristics and inflorescence when still in early stages of development (small bud).

TAXONOMY

Hoya decipulae S.Rahayu & Astuti *spec. nov.* — Type: Indonesia, Sumatra, West Lampung, Hutan Lindung Register 48B area, Mixed Hill Forest, 16 July 2017, *IP Astuti IPA 1231/2017* (Holotype, BO!; isotype, BOHB!) Fig. 1 and 2.

Diagnosis. This species is similar to *Hoya papaschonii*, *H. solokensis* and *H. irisae* by its shrubby habit, thin lanceolate leaves and inflorescence but differs in having corolla and corona shape, size and the way of opening corolla lobes. The corolla of *H. papaschonii* has smaller size and directly spreads open to only 30–45 degrees, while the corona of *H. papaschonii* has interstaminal corona lobes that is absent in *H. decipulae*. The corolla of *H. solokensis* also has smaller size and directly spreads open to more than 90 degrees. In *H. decipulae*, corolla open to 90 degree by forming a mini “cage” in advance, as a result of the attachments of the corolla apexes. The corona of *H. decipulae* gynostegial, erect, stiff and waxy-looking resembling those of *H. multiflora* and *H. irisae* except at the base.

Epiphytic shrub, with white latex in all vegetative parts. Roots only basal, no adventitious roots observed. *Stems* terete about 3–5 mm diam., bright green, sparsely pubescent; older stems grey, glabrous; internodes (1.5)4–10 cm. *Leaf* blades thin, not succulent, chartaceous when dry, lanceolate, base acute, apex acuminate, (4)6–13 (15) × 2–5 cm, dark green on adaxial surface, lighter green on abaxial surface, glabrous, venation pinnate, midrib slightly depressed on adaxial surface, convex on abaxial surface, secondary veins 5–7(8) pairs, basal colleters absent; petioles terete channelled above, (5)10–5(20) × (1.5)2–3 mm in diam., sometimes twisted, green, sparsely pubescent. *Inflorescences* umbelliform, convex, of 1–8(10) flowers, peduncles extra-axillary, horizontal or rarely negatively geotropic, unbranched, 1 or rarely 2 at each node, producing flowers many times, terete, 15–25 × 1.5–2.0 mm,

green, sparsely pubescent just below the rachis, otherwise glabrous; rachis with membranaceous bracts at the base of each pedicel, triangular, *ca.* 1 × 1 mm, glabrous. *Flowers* with terete pedicels 7–9 × *ca.* 1.5 mm in diam., light green, greenish white or white, minutely pubescent. Calyx lobes ovate-broadly triangular, apex round, *ca.* 1.5 × *ca.* 1 mm, overlapping at the base, light green, minutely pubescent outside, glabrous inside, basal colleters absent. Corolla tube basally bulbous, enveloping the corona with a contracted throat, without or very short tube just below the free, lanceolate, spreading lobes after fully open, forming a cage before fully open, white coloured; basal bulbous part 3.5–4.0 mm tall, 3–4 mm diam., tube below the bulbous part *ca.* 1 mm long, *ca.* 2 mm wide, free lobes triangular lanceolate, laterally recurved outward, 10–15 × *ca.* 1(3) mm, pubescent outside, glabrous inside, tube densely pubescent inside, hairy at the throat, *ca.* 2 mm long. Corona gynostegial, erect, stiff, and waxy-looking, 4–4.5 mm high, 2–3 mm in diam., white to ivory white; *ca.* 1.5 mm high and 1.5 mm diameter, inner lobes erect, recurved inward, oblong, alternating with the pollinaria, *ca.* 4 × 0.5 mm, outer lobes missing, bumpy at the base; Anthers broadly triangular, *ca.* 1.5 × 0.7 mm with apical round membranaceous brown appendage just below stigma. Pollinia elliptic-oblong, narrowing towards the base with a round base and apex, 190–210 × 80–100 μm; pellucid margin absent; caudicles rhomboid, 80–90 μm long; retinaculum broadly ovoid, *ca.* 100 × *ca.* 90 μm; style-head 5 angled in cross section, with 5 spreading lobes alternating with the stamens, style-head apex conical, 1–1.5 mm long, 0.8–1 mm broad at the base, apex acute; ovary bicarpellate, ovoid, apex narrowed, truncate, 1.5–2 mm high. *Fruits* single follicles, 6–8 cm × 3–4 mm, slightly curved, green (immature), color not seen at maturity, glabrous. Seeds 15–30 in each follicle, slightly flattened, without differentiated margins, 4–5 × *ca.* 1 mm, long-comose, coma 3–4 cm long.

Etymology. The specific epithet ‘decipulae’ refers to the characteristic of the corolla arrangement just before fully open, which resembles a mini cage.

Distribution. Only known from the type localities in West Lampung, Sumatra, Indonesia in Protected Forest.

Habitat and ecology. The plant was observed growing as an epiphyte on bamboo plants in disturbed mixed hill forest at an elevation of 783 m. *Hoya* is usually reported in association with

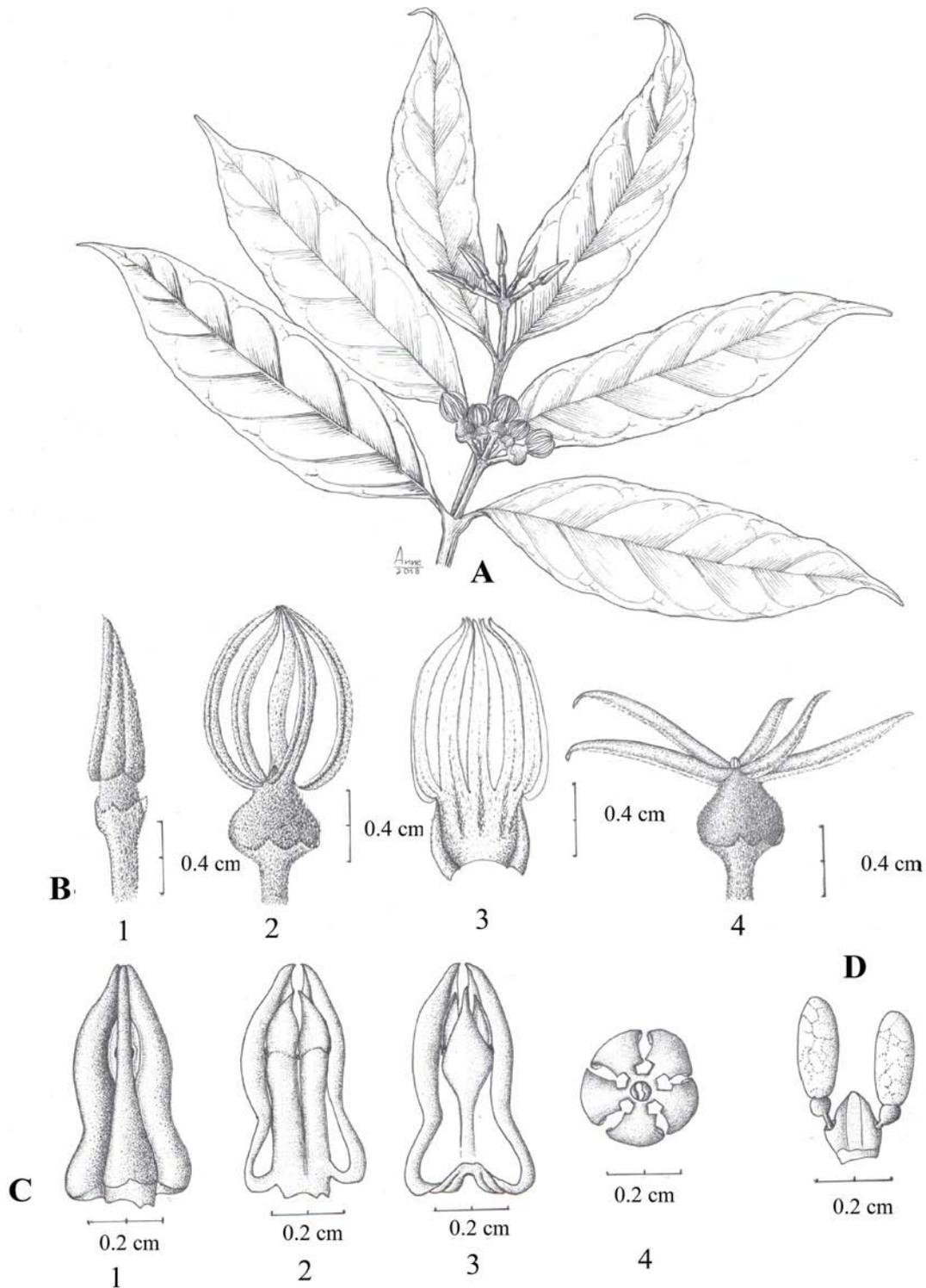


Fig. 1. *Hoya decipulae* S.Rahayu & Astuti, *spec. nov.* A. Leaves and flowers. B. The development of flower from (1) bud, (2,3) cage form, (4) open corolla. C. Corona (1,2,3) side view and (4) view from above. D. Pollinia. From IP Astuti IPA 1231/2017 (BO), drawn by Anne Kusumawaty (BO).

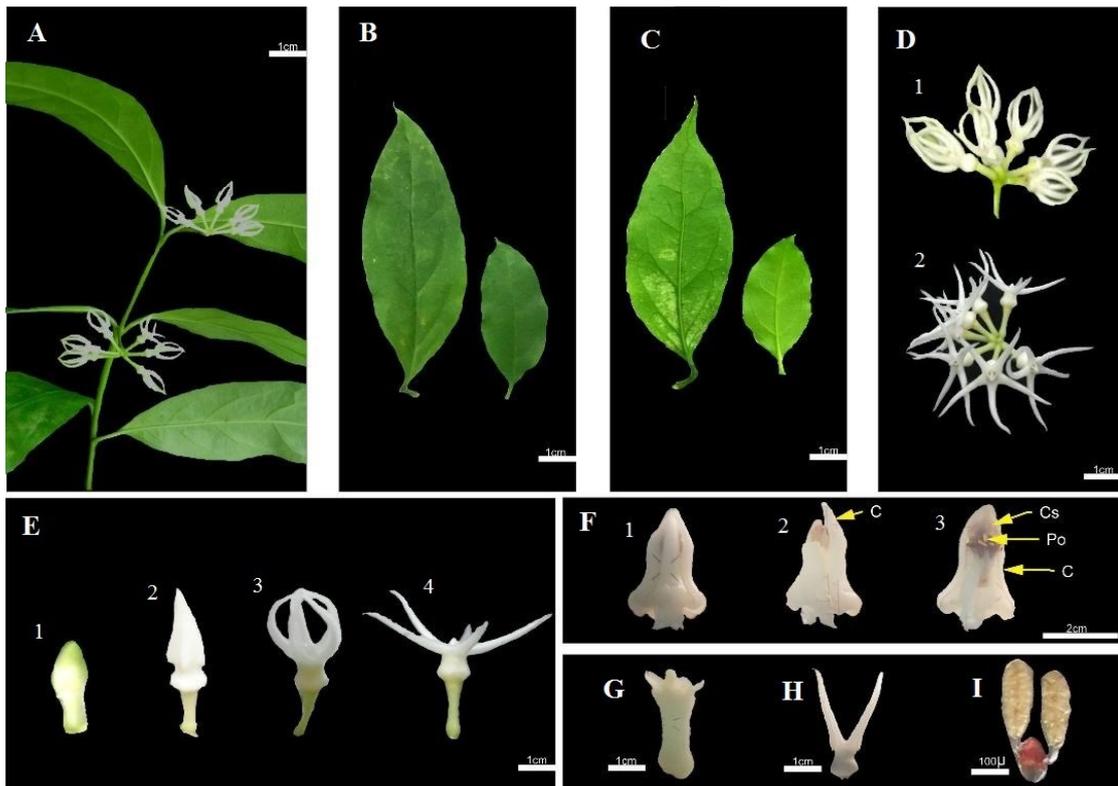


Fig. 2. *Hoya decipulae* S.Rahayu & Astuti, *spec. nov.* A. Plant habit with cage form of newly opening flowers. B. Leaves adaxial surface. C. Leaves abaxial surface. D. Inflorescence: (1) cage form, (2) fully open flowers. E. Development of flower: (1) early bud, (2) late bud, (3) cage form, (4) fully open flower. F. Corona (1,2,3) – side view: C=Corona; Cs=staminal corona lobes; Po=pollinia. G. Pedicel. H. Back view of corolla lobes (laterally curved outward). I. Pollinia. Photos: S. Rahayu.



Fig. 3. *Hoya decipulae* S.Rahayu & Astuti, *spec. nov.* Live plant in the wild: A. Fruit (follicle). B. Flowers in bud. Photos: I. P.Astuti.

ants (Rahayu *et al.*, 2007; Wanntorp & Kunze, 2009; Kleijn & van Donkelaar, 2001). *Hoya decipulae* was observed growing in association with ant nests in the bamboo plants.

Conservation status. Known from only one locality with only one plant with several branches and several inflorescences and fruit. The preliminary conservation status of *H. decipulae* is Data Deficient (DD) (IUCN, 2017). *Ex situ* collections are present in Bogor Botanic Gardens.

DISCUSSION

Hoya decipulae is most similar to *H. papaschonii*, a species from South Thailand. Both species share the same habit as an epiphytic shrub with thin or non-succulent and lanceolate leaves, and similarities in the inflorescence. The difference between the two species lies in the corolla and corona shape, size and the way of opening. *Hoya decipulae* flowers, which bloom for about 8 days (in some cases up to 20 days), form a cage (Fig. 1) from the corolla formation on the first day of blooming which persists for 1–3 days. The corolla then spreads at 90 degrees from the axis for 3–4 days before, in some cases, reforming as a cage for a day before dropping off. In some cases the corolla did not spread at all and maintained a cage shape until dropping off at 20 days. This cage formation is a unique characteristic of this new species, and so far has not been observed in other *Hoya* species. In *H. papaschonii*, the corolla directly spreads open to only 30–45 degrees (Rodda & Ercole, 2014-Fig, 3 & 4). *Hoya decipulae* flowers are larger and have a longer proportion of free petal than the smaller flowers of *H. papaschonii*. These differences are also expressed in corona shape and size. The corona of *H. decipulae* is much longer (higher) than that of *H. papaschonii* and differs in shape. There is no interstaminal corona in *H. decipulae*, as observed in *H. papaschonii*, although it is bumpy at the base. The corona of *H. decipulae* resembles the corona of *H. multiflora* (Blume, 1823; 1826) especially in the erect inner lobes, however in *H. decipulae*, the outward acute outer corona lobes are absent (Fig. 1). The corona most resembling that of *H. decipulae* is the corona of *H. irisaie* (Ferrerias *et al.*, 2014). Aside from the corona, the overall vegetative and generative parts of *H. irisaie* are the closest to resembling *H. decipulae* aside from *H. papaschonii*. *Hoya irisaie* is a shrubby, non-succulent leaved *Hoya* with longer leaves than *H. decipulae*. The difference between these species lies in the peduncle length, which is longer and pendulous

(geotropic positive) in *H. irisaie*, while in *H. decipulae* the peduncle is short and erect (geotropic negative). The most obvious difference between the two species is the spreading yellowish corolla in *H. irisaie*. The corona of *H. irisaie* is erect, white, stiff and waxy-looking and the third part is inserted in the corolla tube as in *H. decipulae*. The size is smaller *i.e.* 0.87 cm long in *H. irisaie* and 1.5 cm in *H. decipulae*. The inner lobes are very similar in the way they recurve inward and the bumpy-looking outer lobes are also similar. The difference lies in the basal shape of the outer lobes. The corona lobes of *H. irisaie* have a more narrow base and are tapered at the bottom, then enlarge and become wider at the bumpy area just after the bottom, before narrowing again at the center toward the inner lobes. This has resulted in a small gap between interlobes at the base and a long gap between interlobes in the upper half of the corona. The corona lobes of *H. decipulae* have the same manner, with a narrower gap between interlobes. The pollinia of *H. decipulae* have a similar form and size to those of *H. papaschonii* and *H. irisaie* but differ in their margin. The pollinia of *H. decipulae* have no pellucid margin, unlike that observed in *H. papaschonii* and *H. irisaie*, although the pellucid margin of pollinia in *H. irisaie* is very weak (Ferrerias *et al.*, 2014).

From a commercial or horticultural point of view, this new *Hoya* species has high value as an ornamental pot plant. The cage form of the corolla before full bloom is unique, and its subsequent spread to 90 degrees from the axis with shiny white petals contrasts attractively with the green color of its leaves. The flowering time for this species is quite long for a *Hoya*, reaching 8 days with open flowers and in some cases up to 20 days in the cage form. This species was observed to have free flowering times in the green house at Bogor Botanic Gardens, however is yet to produce fruit, possibly due to the absence of appropriate pollinators in the green house. In *H. papaschonii*, fruits are produced freely even in the green house which may be a result of either self-pollination instead of the present of pollinator. This types of pollination have not been reported elsewhere in the genus. Another advantage of *H. decipulae* for promotion as an ornamental plant, particularly as a potted indoor plant, is its shrubby habit which makes it easier to maintain and display than climbing Hoyas. This species is easily propagated by stem cuttings.

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