

An Enumeration of Hoyas in Quezon Province, Luzon Island, Philippines

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ABSTRACT:- This study provides a list of *Hoya* species found in Quezon province, Luzon Island, Philippines. Several literature revealed that there are 39 species and six subspecies of *Hoya* found in the province of Quezon. From these species, 37 are endemic in the Philippines and two are indigenous. Human activities that can lead to forest degradation like illegal logging and slash-and-burn farming were identified as threats to the survival of the *Hoya* in Quezon. Protection of the forest habitat, the home of *Hoya*, as well as conducting assessment of the conservation status of these *Hoya* in the local level are recommended in order to strengthen the conservation efforts to protect the *Hoya* in the province.

KEY WORDS: *Hoya*, Quezon province, Philippines, conservation

INTRODUCTION

Hoya is a genus of flowering plants belonging to the family Apocynaceae. Commonly known as wax plant, the beautiful inflorescences it exhibits make Hoyas popular for its ornamental use. Because of its ethnomedicinal accounts (Atiqur Rahman and Wilcock, 2007; Bradacs *et al.*, 2011; Das *et al.*, 2008; Samuel *et al.*, 2010; Zheng and Zhing, 2009), the medicinal application of *Hoya* species has been investigated recently by studying its chemical properties (Ebajo *et al.*, 2014; Ebajo *et al.*, 2014, 2015a-c; Ragasa *et al.*, 2016).

The Philippines is known as a center of diversity of Hoyas (Kloppenbun and Siar,

2008). As of 2013, there are 109 recorded species of Hoyas, 88 of which are endemic in the country (Aurigue, 2013). This study provides a list of *Hoya* species found in Quezon province, Luzon Island, Philippines. Quezon became a subject of interest to this study since the number of Hoyas discovered in this province has been growing lately; but the list of names are scattered in various sources. There is a need to have an enumeration in one paper for convenience. Furthermore, this research looks into the possible threats for these *Hoya* species within the context of Quezon province.

MATERIALS AND METHODS

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Study Area

Quezon is a narrow province located in the eastern portion of Luzon, the largest island in the Philippines (Fig. 1). It is composed of 39 municipalities and two cities. It is bounded by the province of Aurora on the north, Laguna and Rizal on the west, Batangas on the southwest and Camarines Norte and Camarines Sur on the south. Its topography is described as rugged, with few plains, valleys and swamps (Quezon Provincial Information and Communications Technology Office, 2015). Quezon province exhibits three climate types: (1) no dry season with very pronounced rainfall from November to January and wet during the rest of the year (Type II); (2) not very pronounced season and relatively dry from November to April and wet during the rest of the year (Type I); and (3) with more or less evenly distributed rainfall throughout the year (Type IV) (Department of Environment and Natural Resources Region IV-A, n. d.). The province of Quezon (as recorded in Tayabas City from 1971-2000) has a mean annual temperature of 26.5°C and mean annual rainfall of 3152.8mm (Banaticla and Buot, 2005).

Out of the 23 declared protected areas in Region IV-A (CALABARZON), 16 are situated within the political boundary of Quezon province (DENR-Biodiversity Management Bureau, n. d.). This includes nine watershed forest reserves and four protected landscapes.

Data Collection

The checklist was constructed through consulting several literature publications (Aurigue, 2013; Hadsall *et al.*, 2015; Kloppenburg, 1990, 1999, 2012, 2014a-c, 2015a-b; Kloppenburg *et al.*, 2013a-j; 2014a-e; 2015a-e; 2016; Kloppenburg and Carandang, 2013; Kloppenburg and Mendoza,

2015a, 2015b; Kloppenburg and Siar, 2008, 2009, 2014, 2015; Merrill, 1923-1926; Schlechter, 1906). These references range from classic literature about Philippine flora up to the latest e-publications about *Hoya*.

Upon consulting the publications, the species and subspecies of *Hoya* that were reported to be found in Quezon province, Philippines were tabulated in the list. Other notable information like the geographic distribution for each species and the references where these species were reported were also noted.

RESULTS AND DISCUSSION

There are 39 species and six subspecies of *Hoya* reported in Quezon province, as shown in Table 1. Among the species, 37 are recorded as endemic in the Philippines and two are indigenous. In terms of their conservation status, all species were not assessed both in global (IUCN Red List of Threatened Species) and national scale (DENR DAO 2007-01). Most of the Hoyas listed are epiphytic, thriving on trees in forests ranging from low to 650 meters above sea level (masl).

It is also worth noting that many (30) among the listed species and subspecies were discovered recently. Twenty-five species and five subspecies were reported in publications dated from 2013-2015. This only shows that the current research efforts in Hoyas paved way to the discovery of these new species. While it is becoming a fact that there are a lot of Hoyas in Quezon province, there still remains the possibility that there are more species that await to be discovered, not only in Quezon but also in the other parts of the Philippines.

Results show that Quezon province houses a relatively high number of *Hoya* species, compared to other places in the Philippines. In

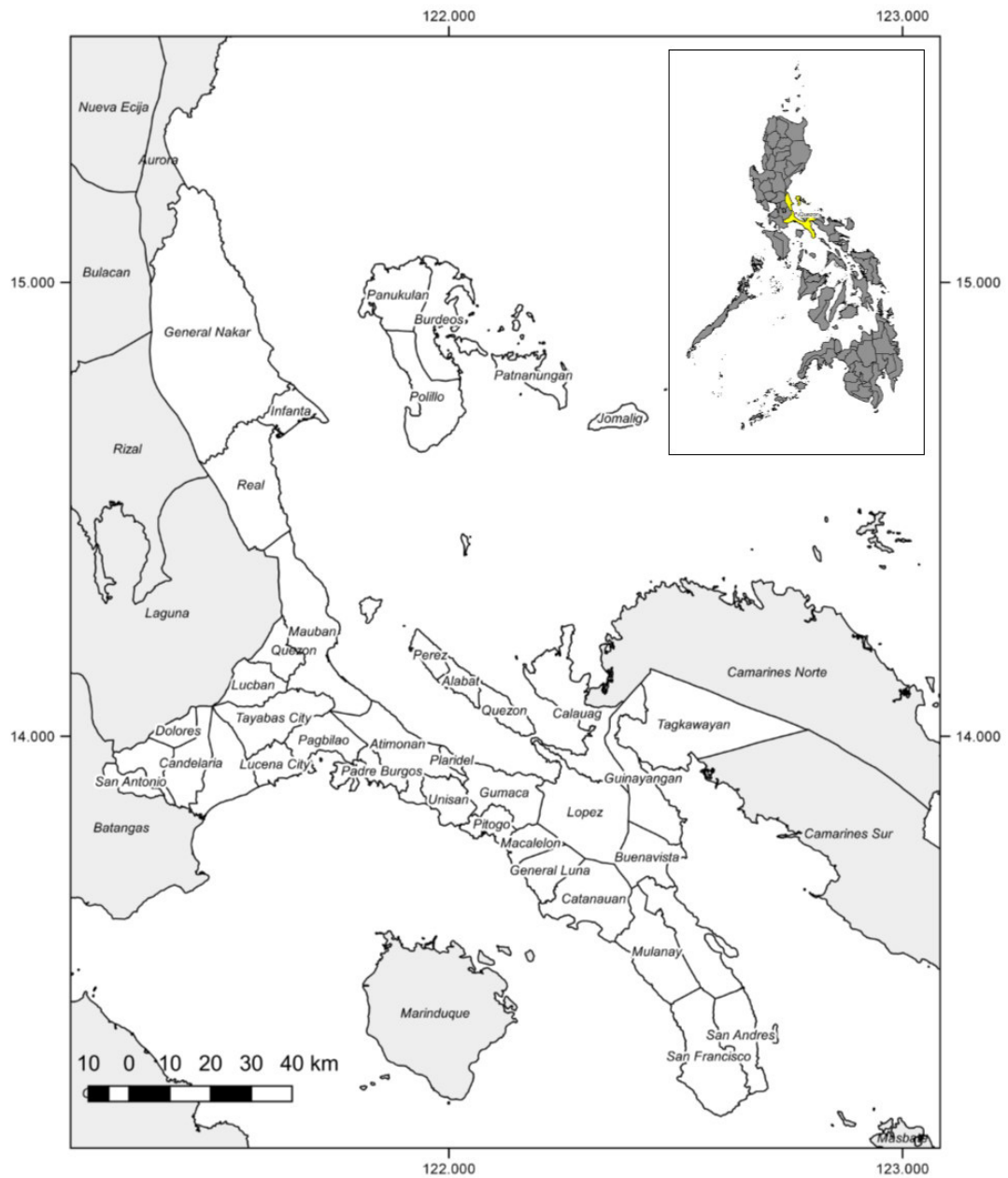


Figure 1. Map of Quezon province. The inset map shows the location of Quezon province at the eastern portion of Luzon Island, Philippines.

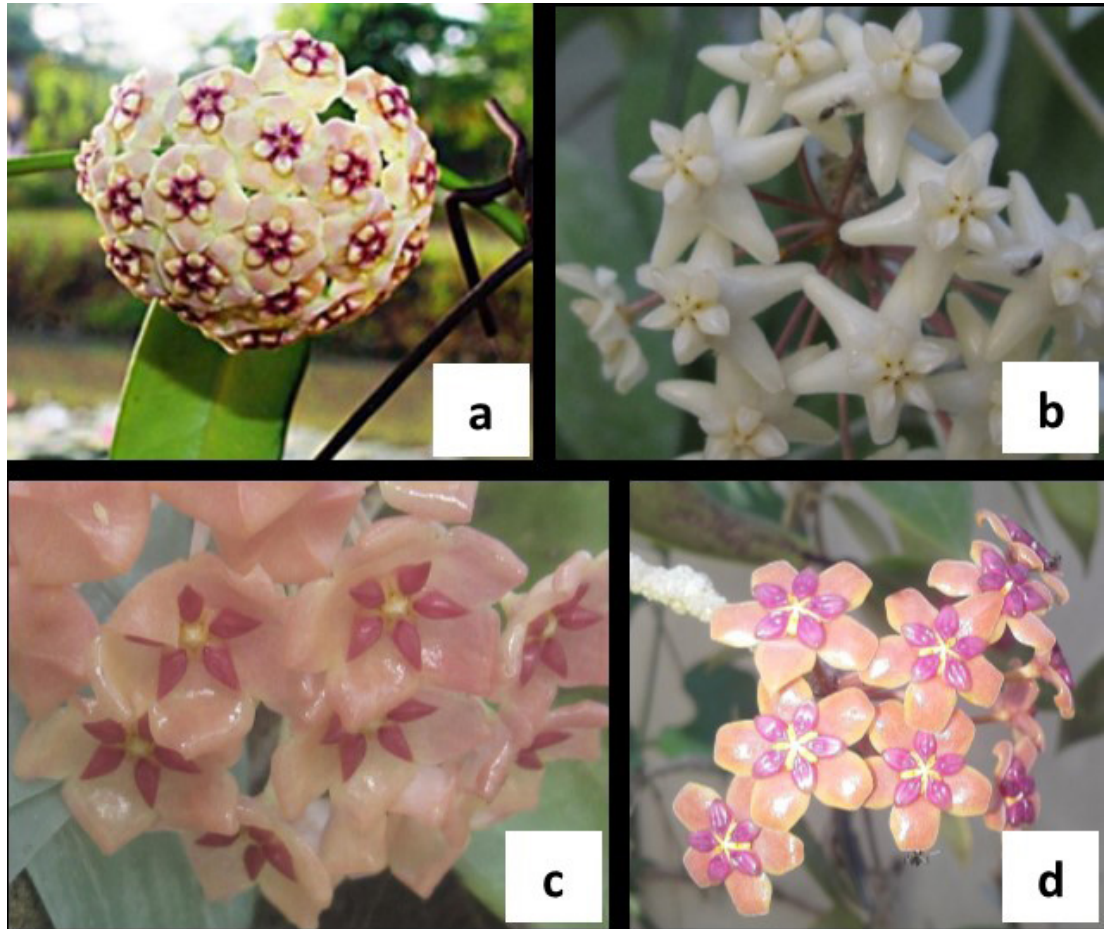


Figure 2. Some of the *Hoya* species found in Quezon Province, Luzon Island, Philippines: a) *Hoya meliflua* subsp. *escobinae*, b) *Hoya pimenteliana*, c) *Hoya blashernaezii* subsp. *siariae* and d) *Hoya soligamiana*. Photo credits: (a) Jennifer Conda (b,c,d) Edward Agdeppa.

an enumeration of Hoyas in Mindoro Island (Villaueva and Buot, 2016), 18 species of Hoyas were documented. Fifteen of these are endemic in the Philippines. Moreover, in a checklist of Hoyas in Palawan (Santiago and Buot, in press), there were 17 species of *Hoya* reported, 11 of which are endemic. The information on number of Hoyas in the other provinces of the Philippines; however, is still lacking.

Hoyas are widely distributed, not only in the Philippines, but its distribution extends from the southern mainland Asia, to the archipelago of Southeast Asian Region up to

northern Australia and Pacific Islands. Along with New Guinea, the Philippines has one of the highest diversity of Hoyas, compared to other places where this species can be seen such as Malaysia, Borneo and Sulawesi (Wanntorp *et al.*, 2014).

Habitat Degradation

Alarmingly, the forest habitats where these Hoyas mostly thrive are being destroyed, due to anthropogenic activities like illegal logging and slash-and-burn farming (Gascon *et al.*, 2013; Santiago and Buot, 2015).

Moreover, illegal logging does not only affect by threatening the local biodiversity; it also aggravates effect of disaster. For instance, during the last months of 2004, when the most destructive landslide due to heavy rains brought by four successive typhoons devastated the province of Quezon (Gaillard *et al.*, 2007). This badly affected the municipalities of General Nakar, Infanta, and Real, resulting to thousands of casualties. This event, including other illegal logging that was rampant in the Philippines has forced the government to implement a total log ban throughout the country (E.O. 23, s. 2011). Conversely, recent reports show that logging activities still continue to happen in Quezon province, despite having this law taking into effect (Locsin, 2015; Mallari, 2012, 2015, 2016).

CONCLUSION AND RECOMMENDATIONS

In summary, there are 39 species and six subspecies of Hoyas found in Quezon province, Luzon Island, most of which were newly discovered. There is a need for assessment of the conservation status of these *Hoya* species in the local level. The destruction of the forest cover due to human activities can threaten these Hoyas; therefore, the protection of this natural habitat can be very vital for the conservation of Hoyas and of plant biodiversity as a whole.

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Table 1 Checklist of *Hoya* species in Quezon Province, Philippines

SPECIES	GEOGRAPHIC DISTRIBUTION	REFERENCES
<i>Hoya acanthominima</i> Kloppenb., G.Mend. & Ferreras	Meragondon, Real, Quezon Province; endemic	Hoya New 1(1): 22. 2013 [Nov 2013]
<i>Hoya albida</i> Kloppenb., Cajano & Carandang	Quezon Province; endemic	Hoya New 1(3): 3. 2013 [Dec 2013]
<i>Hoya bebsguevarrae</i> Kloppenb. & Carandang	Real, Quezon Province; endemic	Hoya New 1(4): 3. 2013 [Dec 2013]
<i>Hoya bifunda</i> Kloppenb., Siar, Cajano, G.Mend., Guevarra & Carandang	Polillo Island, Quezon Province; endemic	Hoya New 1(3): 7. 2013 [Dec 2013]
<i>Hoya bifunda</i> Kloppenb., Siar, Cajano, G.Mend., Guevarra & Carandang subsp. <i>integra</i> Kloppenb., Siar, Cajano, Guevarra & Carandang	Gumian, Burdeos, Polillo Island, Quezon Province; endemic	Hoya New 1(3): 17. 2013 [Dec 2013]
<i>Hoya blashernaезii</i> Kloppenb. subsp. <i>siariae</i> (Kloppenb.) Kloppenb.	Tayabas, Quezon Province; endemic	Hoya New 2(1): 50. 2014 [Jan 2014]; Hoya New 2(2): 50. 2014 [Apr 2014]
<i>Hoya blashernaезii</i> Kloppenb. subsp. <i>valmayoriana</i> Kloppenb., Guevarra & Carandang	Tayabas, Quezon Province; endemic	Hoya New 2(2): 10. 2014 [Apr 2014]; Hoya New 2(3): 4. 2014 [May 2014]
<i>Hoya bordenii</i> Schltr.	Benguet, Pangasinan, Bulacan, Bataan, Cavite, Quezon (Tayabas), Sorsogon; on trees in primary forests at low altitudes; 650m; endemic	Enum. Philipp. Fl. Pl. iii. 352 (1923)
<i>Hoya buotii</i> Kloppenb.	Mt. Banahaw, Quezon Province, Sierra Madre, Mt. Halcon, Mindoro; endemic	Aurigie, A collection of Philippine Hoyas and their culture, 32-33. 2013
<i>Hoya camphorifolia</i> Warb.	Benguet, Quezon (Tayabas), Sorsogon, Mindoro; low-370m, endemic	Enum. Philipp. Fl. Pl. iii. 351 (1923)
<i>Hoya carandangiana</i> Kloppenb. & Siar	labeled as Quezon Province 3-105; endemic	Hoya New 4(4): 8. 2015 [Jul 2015]
<i>Hoya concava</i> Kloppenb., Siar, Guevarra & Carandang	Quezon Province; endemic	Hoya New 3(2): 9. 2014 [Dec 2014]
<i>Hoya cupula</i> Kloppenb., G.Mend. & Ferreras	Gen. Nakar, Quezon Province; endemic	Hoya New 1(1): 15. 2013 [Nov 2013]
<i>Hoya darwinii</i> Loher	Rizal, Quezon (Tayabas), Panay; in forests at low to medium altitudes, endemic	Enum. Philipp. Fl. Pl. iii. 352 (1923)
<i>Hoya edwinofernandoi</i> Kloppenb., Cajano & Hadsall	Gen. Nakar, Quezon Province; endemic	Hoya New 5(2): 22. 2015 [Dec 2015]
<i>Hoya espaldoniana</i> Kloppenb., Siar & Cajano	Puerto Galera, Oriental Mindoro; Polillo Island, Quezon Province; endemic	Asia Life Sci. 24(2): 66 (-70; figs. 7-9). 2015
<i>Hoya foxii</i> Kloppenb.	Dibutunan, Baler Quezon Province; endemic	Hoya New 2(1): 46. 2014 [Jan 2014]

Table 1 (Continue)

SPECIES	GEOGRAPHIC DISTRIBUTION	REFERENCES
<i>Hoya incrassata</i> Warb.	Rizal, Laguna, Quezon (Tayabas), Sorsogon, Polillo, Mindoro, Busuanga, Panay, Camiguin de Misamis, Mindanao; on trees at low altitudes; indigenous	Enum. Philipp. Fl. Pl. iii. 352 (1923)
<i>Hoya lazaroii</i> Kloppenb. & Siar	Mt. Banahaw, Quezon Province	Asia Life Sci. 17(1): 66 (-70; figs. 7-9). 2008
<i>Hoya leticiae</i> Kloppenb., Cajano & Hadsall	Gen. Nakar, Quezon Province; endemic	Hoya New 5(2): 16. 2015 [Dec 2015]
<i>Hoya litii</i> Kloppenb., Siar & Cajano	Burdeos, Quezon Province; endemic	Hoya New 5(2): 8. 2015 [Dec 2015]
<i>Hoya loheri</i> Kloppenb. subsp. <i>tanawanensis</i> Kloppenb. & G.Mend.	Mt. Tanawan, Quezon Province; endemic	Hoya New 5(1): 30. 2015 [Sep 2015]
<i>Hoya madulidii</i> Kloppenb.	Ifugao, Quezon, Davao Oriental and Zamboanga, Palawan, Mindoro and Sulu; low altitude endemic	Fraterna 1(3), Philipp. Hoya Sp. Suppl.: IV. 1990; Aurigue, A collection of Philippine Hoyas and their culture, 98-99. 2013
<i>Hoya marananiae</i> Kloppenb., Siar, Cajano & Carandang	Burdeos, Quezon Province; endemic	Hoya New 4(4): 13. 2015 [Jul 2015]
<i>Hoya martinii</i> Kloppenb. & G.Mend.	Real, Quezon Province; endemic	Hoya New 5(1): 3. 2015 [Sep 2015]
<i>Hoya meliflua</i> Merr. subsp. <i>escobinae</i> Kloppenb. , Conda , Buot & Pitargue	Quezon Protected Landscape	Hoya New 6(1): 10, figs. 1-8. 2016 [Dec 2016]
<i>Hoya merrillii</i> Schltr.	Nueva Vizcaya, Quezon (Tayabas, Cavite), Camarines, Mindoro, Panay, Davao; low-250m; endemic	Enum. Philipp. Fl. Pl. iii. 353 (1923)
<i>Hoya moninae</i> Kloppenb. & Cajano	UP Land Grant, Quezon Province; endemic	Hoya New 2(1): 41. 2014 [Jan 2014]
<i>Hoya myrmecopa</i> Kleijn & Donkelaar	Sulawesi, Laguna, Quezon; indigenous	Aurigue, A collection of Philippine Hoyas and their culture, 112-113. 2013
<i>Hoya nakarensis</i> Kloppenb., G.Mend. & Ferreras	Gen. Nakar, Quezon Province; endemic	Hoya New 1(1): 34. 2013 [Nov 2013]
<i>Hoya pimenteliana</i> Kloppenb.	Casaguran, Quezon Province, Philippines; endemic	Fraterna 12(3): 7.1999 [Jul-Sept 1999]
<i>Hoya platycaulis</i> Simonsson & Rodda	Laguna and Quezon; endemic	Aurigue, A collection of Philippine Hoyas and their culture, 126-127. 2013
<i>Hoya polilloensis</i> Kloppenb., Guevarra, G.Mend. & Ferreras	Polillo Island, Quezon Province; endemic	J. Nat. Stud. 12(1): 19. 2013 [16 Jul 2013]
<i>Hoya pubicalyx</i> Merr.	Luzon (Tayabas, east coast); low altitude; endemic	Philipp. J. Sci., C 13: 331. 1918

Table 1 (Continue)

SPECIES	GEOGRAPHIC DISTRIBUTION	REFERENCES
<i>Hoya pubicenta</i> Kloppenb., G.Mend. & Ferreras	Gen. Nakar, Quezon Province; endemic	Hoya New 2(1): 12. 2014 [Jan 2014]
<i>Hoya pubicorolla</i> Kloppenb., G.Mend. & Ferreras	Mauban, Tayabas Province (Quezon); endemic	Hoya New 1(2): 13. 2013 [Dec 2013]
<i>Hoya ralphdavisiana</i> Kloppenb., G.Mend. & Ferreras	Mt. Tagumpay, Quezon Province; endemic	Hoya New 2(2): 31. 2014 [Apr 2014]
<i>Hoya salmonea</i> Kloppenb., Guevarra, G.Mend. & Ferreras	General Nakar, Quezon Province; 400m; endemic	J. Nat. Stud. 12(1): 22. 2013 [16 Jul 2013]
<i>Hoya soligamiana</i> Kloppenb., Siar & Cajano	Atimonan, Quezon Province; endemic	Asia Life Sci. 18(1): 151 (-154; figs. 10-12).
<i>Hoya tangerina</i> Kloppenb., G.Mend. & Ferreras	Polillo Island, Quezon Province; endemic	Hoya New 2(2): 15. 2014 [Apr 2014]
<i>Hoya unruhiana</i> Kloppenb., Siar, G.Mend., Cajano & Carandang	Polillo Island, Quezon Province; endemic	Hoya New 1(4): 25. 2013 [Dec 2013]
<i>Hoya uplandgrantensis</i> Kloppenb.	UP Land Grant, Quezon Province; endemic	Hoya New 4(4): 3. 2015 [Jul 2015]
<i>Hoya vicencioana</i> Kloppenb., Siar, Cajano, Guevarra & Carandang subsp. <i>quezonensis</i> Kloppenb.	UP Land Grant, Quezon Province; endemic	Hoya New 4(1): 31. 2015 [Jan 2015]
<i>Hoya williamoliveriana</i> Kloppenb., Cajano & Hadsall	Burdeos, Quezon Province; endemic	Hoya New 5(2): 28. 2015 [Dec 2015]
<i>Hoya williamsiana</i> Kloppenb., Siar, G.Mend., Cajano, Guevarra & Carandang	Burdeos, Quezon Province; endemic	Hoya New 1(4): 34. 2013 [Dec 2013]