The Thailand Natural History Museum Journal 11(2): 77-89, December 2017
©2017 by National Science Museum, Thailand

Short communication

Distribution of *Hoya* Species Across Climate Types in the Philippines

Mylene R. Martinez[1*] and Inocencio E. Buot Jr.[1, 2, 3]

[1]School of Environmental Science and Management, University of the Philippines Los Baños, College, Laguna
[2]Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños, College, Laguna
[3]Faculty of Management and Development Studies, University of the Philippines Open University, Los Baños, Laguna

ABSTRACT: Climate is one of the determining factors of vegetation distribution. Plants grow in an environment where their requirements are met and where they can reproduce. They respond to external stimuli such as climate and this is manifested in their morphology. This has long caught the interest of scientists and researchers. This study contributes current knowledge on species distribution of the *Hoya* species in the Philippines. Literature on the distribution of Philippine *Hoya* species across varying climatic types of the country, has been consulted and studied. From this, the identified plants have been mapped and the climate types have been grouped into four types by location: Type I, Type II, Type III, and Type IV. Results had shown that out of 172 species recorded thus far, 99 species were found in areas of Climate Type II. This climate type is relatively humid, suitable for the growth of epiphytic *Hoya* species. Among these areas that have climate Type II the Quezon Province which incidentally has the highest number of *Hoya* species overall with 63 species recorded.

KEY WORDS: climate, *Hoya* species, Philippines, plant distribution

INTRODUCTION

Scientists have long been fascinated with how plants adapt to different environmental factors for survival. In response to environmental factors and for survival, it is a wonder how far plants of the same family and species have evolved so much that some are unrecognizable, or indeed become classed a different species. One of these amazing plants is *Hoya*. There are 200-300 *Hoya* species distributed from India to the Pacific (Wanntorp, 2009).

Hoya is a flowering plant under the family Apocynaceae or Dogbane Family (Aurigue, 2013). It is among the most sought-after ornamental flowers around the world primarily because of its aesthetic value. For the growers and hobbyists, *Hoya* is also important for its potential economic value as medicine. The waxy flower is unique and it comes in a large variety of different colors, sizes, and shapes. *Hoya* species are distributed around the world, with Southeast Asia as the center of diversity within Asia (Rodda and Ang, 2012). In the Philippines, as of 2013, there were 109 recorded species of *Hoya* (Aurigue, 2013). However more recent records (i.e. Kloppenburg, 2017) have added to the list of new species of *Hoya* discovered in the Philippines. Currently, there are over

*Corresponding author.
E-mail: mrmartinez3@up.edu.ph

172 *Hoya* species recorded in the country.

Climate plays a significant role in the distribution of plants around the world. The combination of the mean climate of a region, the variability of that climate, and the predictability of that variation determines the types of plants that will grow in that place (Gurevitch, *et al*, 2006). Knowledge of vegetation patterns and the corresponding environmental factors, specifically climate that influences the distribution of plants has enabled better management strategy for natural resources. Therefore, this study aims to determine the distribution of *Hoya* species in the country across various climate types.

MATERIALS AND METHODS

Area of Study

The Philippines, an archipelago in Southeast Asia and is one of the biodiversity hotspots of the world (Marchese, 2015). It is home to thousands of species of flora and fauna. Lying next to the Pacific Ocean and several degrees near the equator, the Philippines is a tropical country with two general seasons: wet and dry. Technically, there are four types of climate in the Philippines based on Coronas classification (Tolentino *et al.*, 2016) (Fig. 1). Type I which is characterized by a distinct dry period from November to April and a wet season from May to October. Type II has an even distribution of precipitation all throughout the year, but a very pronounced rainy season from November to January. Type III has seasons which are not very pronounced, but has very relatively dry period which prevails from November to April and Type IV has an evenly distributed precipitation throughout the year.

Data Collection

A review of the different *Hoya* references, monographs and journal articles was conducted resulting in a list of known *Hoya* species in the Philippines detailed in Table 1. The following were the references used: A Collection of Philippine *Hoyas* and their culture (Aurigue, 2013); New Species of Hoya R. Br. (Apocynaceae) from the Philippines (Kloppenburg *et al.*, 2012); Checklist of *Hoya* Species on Palawan Island, Philippines (Santiago & Buot, 2017); An enumeration of Hoyas in Quezon Province, Luzon Island, Philippines (Villanueva & Buot, 2017); and Hoya New Volumes 1 to 7 (Kloppenburg R. D., 2013-2017). Each name was verified in the International Plant Names Index (IPNI). Records on the locality of each *Hoya* species were noted and mapped using the Google Earth Explorer application (Fig. 2). This study only includes *Hoya* species in the Philippines having locations documented in published literature. Other *Hoya* species present in the country but where locality was not detailed, were not included in this paper.

RESULTS AND DISCUSSION

In addition to the 109 *Hoya* species and subspecies reported by Aurigue (2013) there were more than 63 new *Hoya* species recorded in the Philippines from 2013 to July 2017. Out of these, 169 had records that specifically cited the locality of which they are present. Shown in Table 1 is the list of *Hoya* species found in each climate type. Climate type II had the highest number of *Hoya* with 99 species. Climate Type III followed with 71 species. Climate types I and IV tied at the last ranking with 34 species each. The number of *Hoya* species growing in climate type II was relatively higher than the others. Under the Type II climate were the following provinces: Quezon, (a great portion of eastern part); Camarines Norte, (eastern and northern parts); Camarines Sur (eastern and northern parts); Albay (eastern part); Catanduanes; Sorsogon; Samar;

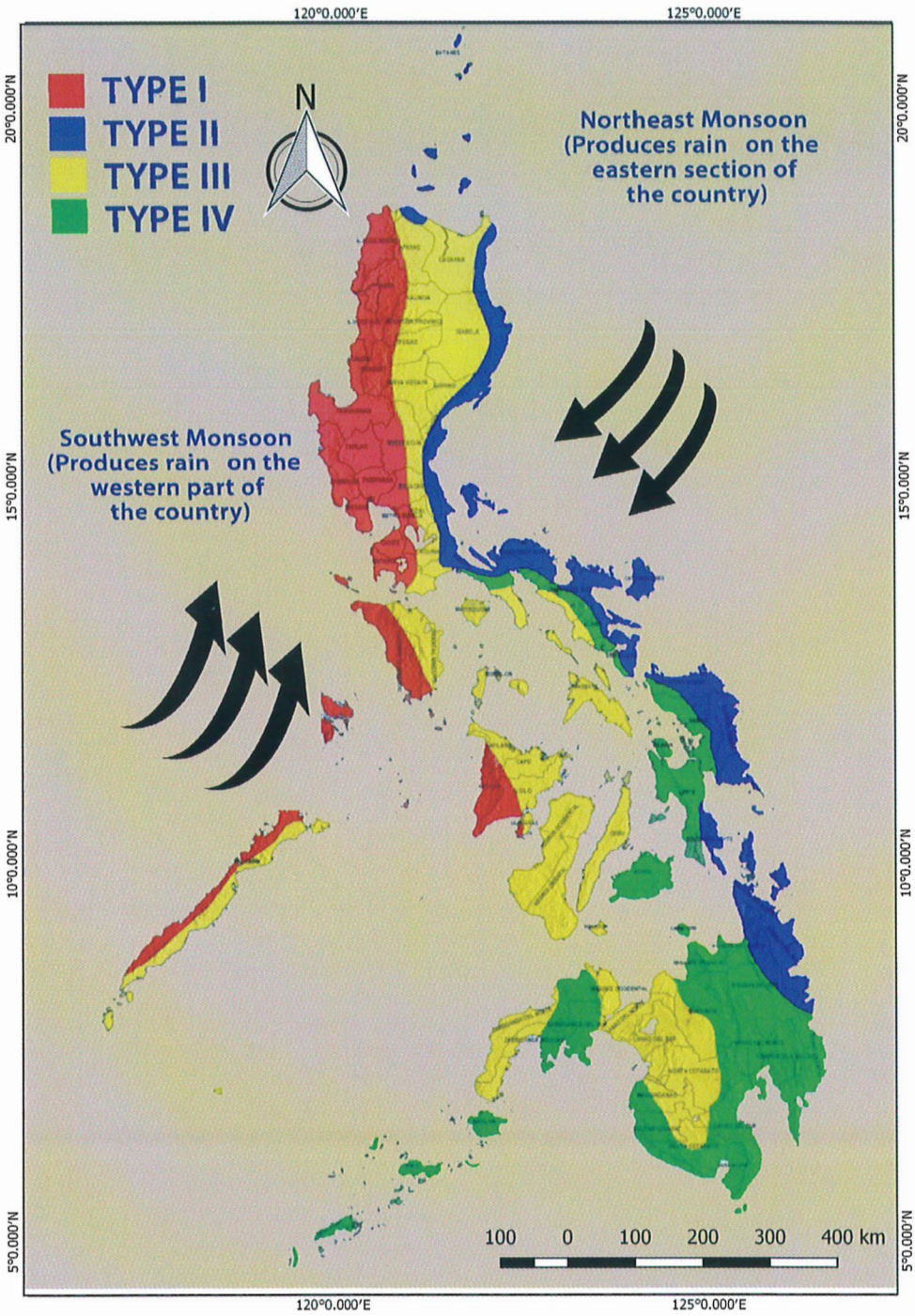


Figure 1. Map of the Philippines showing the distribution of climate types.
(Modified from: http://www.panahon.tv/blog/wp-content/uploads/2ag; date retrieved July 2017)

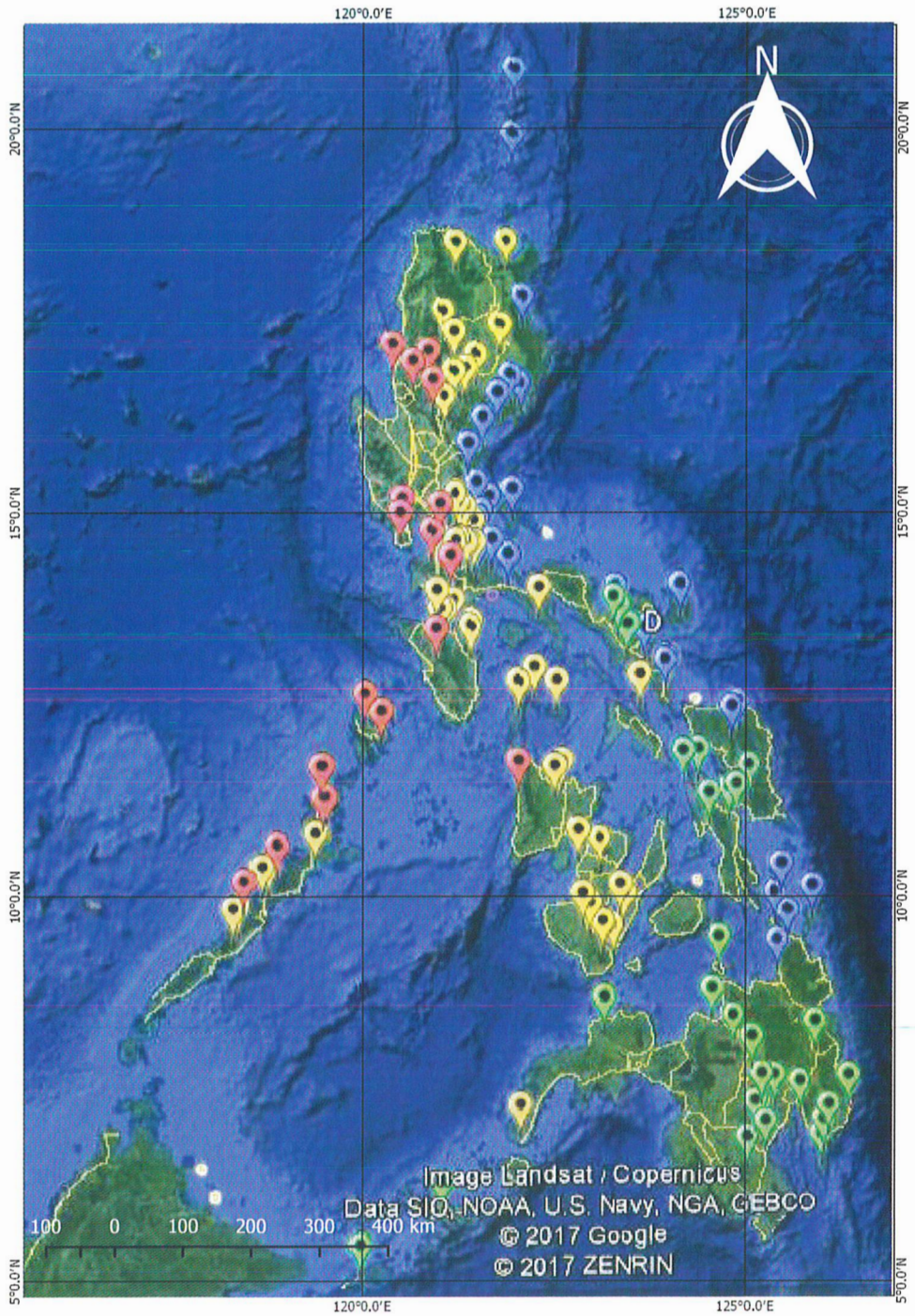


Figure 2. Distribution of *Hoya* species in the Philippines. Each balloon indicates the location of Hoya species taken from existing records. Red balloon – Climate Type I; Blue balloon – Climate Type II; Yellow balloon – Climate Type III; and Green balloon – Climate Type IV (The base map was generated using Google Earth Explorer application and modified using QGIS).

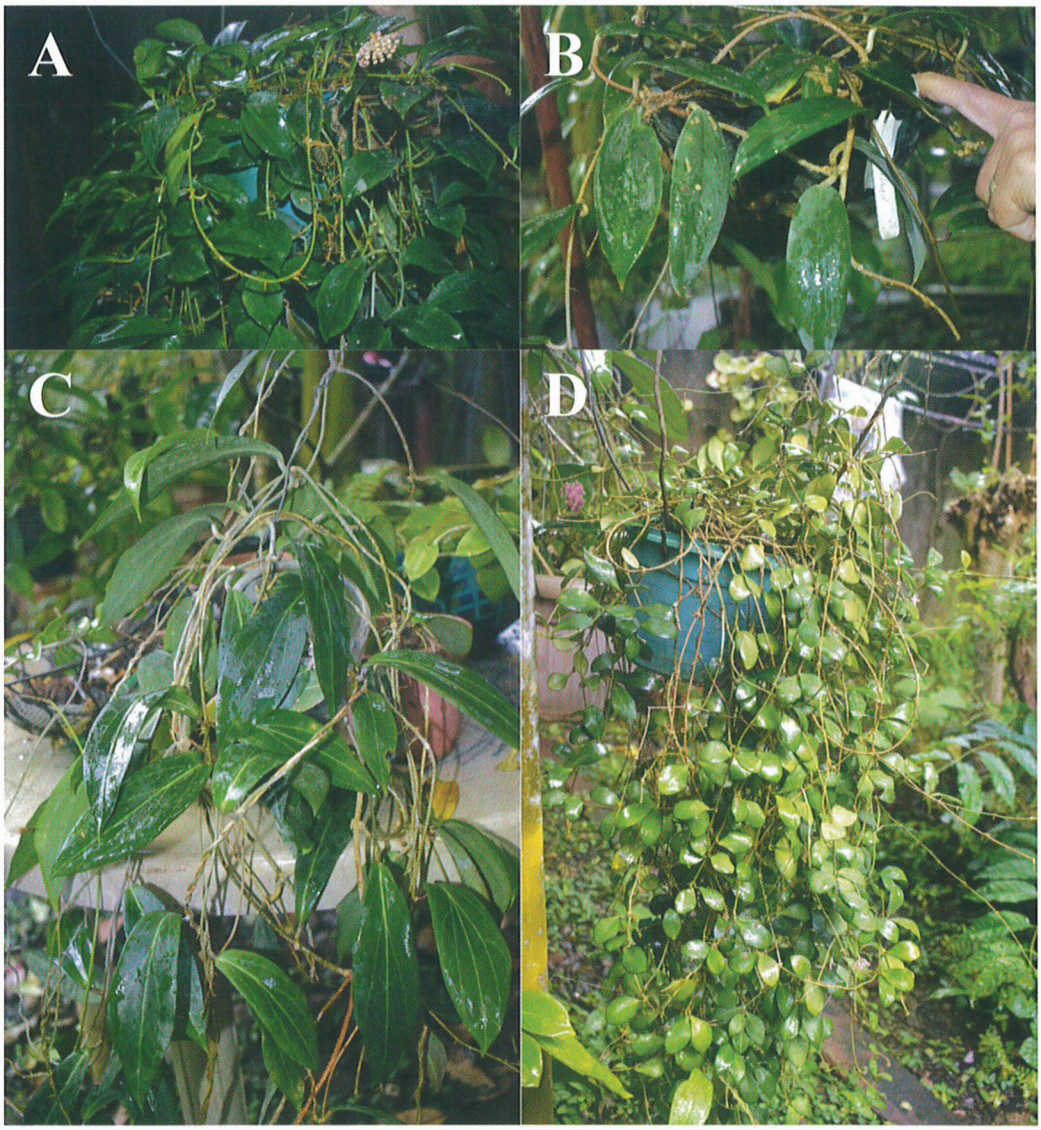


Figure 3. Some of the *Hoya* species endemic to the Philippines: *Hoya obscura* Elmer ex C. M. Burton (A);*Hoya ilagiorum* Kloppenb., Siar, & Cajano (B); *Hoya benguetensis* Schltr. (C); and D. *Hoya bilobata* Schltr.

Leyte del Norte (eastern part) ; Leyte del Sur (eastern part); Surigao del Norte; Surigao del Sur; Agusan del Sur; and Davao (eastern part). These provinces are located on the eastern coast of the country which is in the "typhoon belt" especially the areas from Luzon and the Visayas. These areas experience typhoons more than once a year bringing heavy rain retaining considerable moisture content which even last during the summer months (Fig. 2).

From the list, 63 (37%) of the recorded *Hoya* species with their localities indicated were from Quezon Province which has a Type II climate for most of its part. This was followed with 19 (11%), 18 (11%), 17 (10%), 11 (7%), and 10 (6%) from Palawan, Mindoro, Laguna, Rizal, and Sorsogon respectively. Villanueva and Buot (2017) reported that Quezon Province has 39 species which is a relatively higher number of *Hoya* species than any other places with *Hoya* in the country. Palawan and Mindoro have both climate types I and III. Laguna and Rizal had three climate types: I, II, and III with greater portion for climate Type III. Sorsogon had climate Types II, and IV. Other provinces with *Hoya* had less than 10 species.

In ecology, the vegetation pattern or physiognomy is largely dictated by the temperature and precipitation patterns, which is the climate basically (Gurevitch *et al.*, 2006). Climate is defined as the over-all long-term atmospheric conditions over a large area. Climate Type II was a relatively humid area as implied in the description above and shown in Figure 1. Plants that require more water or moisture are most likely found in this area. One of the planttypes that require relatively high moisture are the epiphytes. Epiphytes are specialized group of plants growing in high canopies (Kriedemann, 1999). Epiphytes including *Hoya* species (Wanntorp, 2009) depend mostly on the moisture from the atmosphere for water thus humid areas are suitable habitat for this group of plants.

CONCLUSION AND RECOMMENDATIONS

Climate is one of the determining factors in the vegetation pattern and species distribution of plants. From the results, Climate Type II has the highest number of *Hoya* species recorded (99). This prevalence of more Hoya species in Type II climate could also be due to less botanical exploration and survey in the other climate types. However, the considerable amount of moisture in the Type II climate may be the reason for this result. To better understand the reason for the prevalence of *Hoya* species found in Climate type II, the following is recommended: 1) experiment and record different *Hoya* plant species in controlled environments (greenhouses) applying varying moisture content to reflect climate types I, II, III, and IV; and 2) quantitative *Hoya* vegetation survey of adaptation to moisture content in the four climatic types of the Philippines.

ACKNOWLEDGMENTS

The authors are thankful to Robert Dale Kloppenburg for the wisdom and encouragement and to the University of the Philippines Los Baños (UPLB) Graduate Mentoring and Apprenticeship Program (GMAP) allowing the senior author to pursue this work at the Plant Systematics Laboratory (Plant Biodiversity Laboratory), Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños.

REFERENCES

Aurigue, F. B. 2013. *A collection of Philippine Hoyas and their culture*. Los Baños,

Laguna: PCAARRD-DOST.

Gamayo, G. 2014. *Panahon TV Blog*. Downloaded from Panahon.tv: http://www.panahon.tv/blog/wp-content/uploads/2ag on 15 August 2014.

Gurevitch, J., S. Scheiner, & G. Fox, 2006. *Climate and Physiognomy*. Sunderland, Massachusetts: Sinauer Associates.

IPNI. (2012). *The International Plant Names Index*. Downloaded from www.ipni.org 15 August 2017.

Kloppenburg, R.D. 2013). *Hoya New Vol. 1 Issue 1*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2013. *Hoya New Vol. 1 Issue 2* . Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html. new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2013. *Hoya New Vol. 1 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2013. *Hoya New Vol. 1 Issue 4*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014. *Hoya New Vol. 2 Issue 1* . Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014. *Hoya New Vol. 2 Issue 2. Fresno*, http:// dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014). *Hoya New Vol. 2 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014. *Hoya New Vol. 2 Issue 4*. Fresno. Downloaded from http://dalek-loppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014). *Hoya New Vol. 3 Issue 1*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014. *Hoya New Vol. 3 Issue 2*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2014. *Hoya New Vol. 3 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2015. *Hoya New Vol. 4 Issue 1*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2015. *Hoya New Vol. 4 Issue 2*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2015. *Hoya NewVol. 4 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2015. *Hoya New Vol. 4 Issue 4*. Fresno. Downloaded from http://dalek-loppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2015. *Hoya New Vol. 5 Issue 1*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2015. *Hoya New Vol. 5 Issue 2*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2016. *Hoya New Vol 5 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2016. *Hoya New Vol. 5 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2016. *Hoya New Vol. 5 Issue 4*. Fresno. Downloaded from http://dalek-loppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2016. *Hoya New Vol. 6 Issue 1*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2017. H*oya New Vol. 6 Issue 2*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2017. *Hoya New Vol. 6 Issue 3*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2017. *Hoya New Vol. 6 Issue 4*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2017). *Hoya New Vol. 7 Issue 1*. Fresno. Downloaded from http://dalekloppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D. 2017. *Hoya New Vol. 7 Issue 2*. Fresno. Downloaded from http://dalek-loppenburg.blogspot.com/2017/02/new-hoya-publications-full-list.html.

Kloppenburg, R.D., J.,Conda, and I.J. Buot, (2016). *Hoya meliflua subspecies escobinea (apocynaceae) : A new* Subspecies of *Hoya Melifua* from Quezon Protected Landscape, Quezon Province, Philippines. *Hoya New*: 9-16.

Kloppenburg, R.D., M. L. Guevarra, J. M. Carandang,, and Maranan. F. S. 2012. New Species of *Hoya* R. Br. (Apocynaceae) from the Philippines. *Journal of Nature Studies*. 11 (1&2): 34 - 48.

Kriedemann, P. 1999. Plant Parasites: Epiphytes. In P. K. al, *Plants in Action*. Melbourne: MacMillan Education Australia.

Marchese, C. 2015. Biodiversity Hotspots: A shorcut for a more complicated concept. *Global ecology and conservation* , 297-309.

Pajuelas, B. (2000). A study of rainfall variations in the Philippines: 1960 - 1996. *Science Diliman*, 12:1, 1 - 28.

Pelser, P., J.,Barcelona and D. Nickrent, 2011. *Co's Digital Flora of the Philippines*. Downloaded from www. philippineplants.org

QGIS Development Team. (2017). *QGIS Geographic Information System*. Downloaded from from Open Source Geospatial Foundation: http://qgis.osgeo.org

Rodda, M., and W. F. Ang, 2012. *Hoya caudata* Hook. F. (Apocynaceae),a new record for Singapore and keys to the *Hoya* Species of Singapore. *Nature in Singapore*, 123-128.

Santiago, J. O. and I. J. Buot, 2017. Checklist of *Hoya* Species on Palawan Island, Philippines. *Journal of Nature Studies*, 34-44.

Tolentino, P.L., A.,Poortinga, H.,Kanamaru, S.,Keesstra, J.,Maroulis, C. P.,David, and C. J. Ritsema, 2016. Projected Impact of Climate Change on Hydrological Regimes in the Philippines. *PLoS ONE*: 1-14.

Villanueva, E.L., and I. J.Buot, 2017. An enumeration of Hoyas in Quezon Province, Luzon Island, Philippines. *The Thailand Natural History Museum Journal*: 23-33.

Wanntorp, L. 2009. Phylogenetics of *Hoya* (Apocynaceae). *Blumea*: 228 - 232.

Received: 13 September 2017
Accepted: 29 November 2017

Table 1 List of *Hoya* species found in each climate type in the Philippines (for details of climate type, please see Fig. 1).

Species	I	II	III	IV
1. *Hoya acanthominima* Kloppenb., Mendoza & Ferreras		✓		
2. *Hoya alagensis* Kloppenb.			✓	
3. *Hoya albida* Kloppenb., Siar, Cajano & Carandang		✓		
4. *Hoya amorosoae* T. Green & Kloppenburg				✓
5. *Hoya amrita* Kloppenb., Siar & Ferreras				✓
6. *Hoya angustisepala* C.M. Burton				✓
7. *Hoya anncajanoae* Kloppenb. & Siar	✓		✓	
8. *Hoya apoensis* Kloppenb. & Siar			✓	
9. *Hoya apoensis* Kloppenb. & Siar subsp. *sagittaria* Kloppenb., Siar, & Ferreras				✓
10. *Hoya aurigueana* Kloppenb., Siar & Cajano		✓		
11. *Hoya bacunganensis* Kloppenburg			✓	
12. *Hoya baguioensis* Kloppenburg			✓	
13. *Hoya bandongii* Kloppenburg & Ferreras			✓	
14. *Hoya barbonii* Kloppenburg		✓		
15. *Hoya bebsguevarrae* Kloppenburg & Carandang		✓		
16. *Hoya benguetensis* Schltr.	✓			
17. *Hoya benitotanii* Kloppenb.			✓	
18. *Hoya bicknellii* Kloppenb.			✓	
19. *Hoya bicolensis* Kloppenb., Siar & Cajano		✓		
20. *Hoya bicolor* Kloppenb.	✓	✓	✓	
21. *Hoya bifunda* Kloppenb., Siar, Cajano, G. Mend., Guevarra, & Carandang		✓		
22. *Hoya bifunda* Kloppenb., Siar, Cajano, G. Mend., Guevarra, & Carandang *subsp. integra* Kloppenb., Siar, Cajano, Guevarra & Carandang		✓		
23. *Hoya bilobata* Schltr.	✓		✓	✓
24. *Hoya blashernaezii* Kloppenb.		✓		
25. *Hoya blashernaezii* Kloppenb. ssp. *siariae* Kloppenb.		✓		
26. *Hoya blashernaezii* Kloppenb. subsp. *valmayoriana* Kloppenb., Guevarra & Carandang		✓	✓	
27. *Hoya bordenii* Schltr.	✓	✓	✓	
28. *Hoya brittonii* Kloppenb.			✓	
29. *Hoya buotii* Kloppenb.		✓	✓	
30. *Hoya burtoniae* Kloppenb.			✓	
31. *Hoya cagayanensis* C. M. Burton		✓	✓	
32. *Hoya camphorifolia* Warb.		✓		
33. *Hoya capotoanensis* Kloppenburg		✓		
34. *Hoya capotoanensis* Kloppenb. subsp. *quezonensis* Kloppenb. & Mendoza		✓		

Table 1 (Continue)

Species	I	II	III	IV
35. *Hoya carandangiana* Kloppenb. & Siar		✓		
36. *Hoya cardiophylla* Merr.		✓		
37. *Hoya carmelae* Kloppenb., Siar & Ferreras				✓
38. *Hoya carnosa* R. Br.		✓	✓	✓
39. *Hoya celata* Kloppenb., Siar, Mendoza, Cajano & Carandang		✓		
40. *Hoya cembra* Kloppenb.			✓	
41. *Hoya chiekoae* Kloppenb., Fererras & Mendoza		✓		
42. *Hoya concav*a Kloppenb., Siar, Guevarra & Carandang		✓		
43. *Hoya corazoniae* Kloppenb., Siar & Ferreras				✓
44. *Hoya coriacea* Blume	✓		✓	✓
45. *Hoya coriacea* Blume subsp. *philippinensis* Kloppenb., Siar & Ferreras				✓
46. *Hoya crassicaulis* Elmer ex Kloppenb.		✓		
47. *Hoya crassicaulis* Elmer ex Kloppenb subsp. *capazensis* Kloppenb.			✓	
48. *Hoya cumingiana* Decne.	✓		✓	✓
49. *Hoya cumingiana* Decne. subsp. *catanauanensis* Kloppenb. & Mendoza		✓		
50. *Hoya cupula* Kloppenburg, Mendoza & Ferreras		✓		
51. *Hoya curtisii* King & Gamble			✓	
52. *Hoya cutis-porcelana* Suarez, Sahagun & Aurigue		✓		
53. *Hoya darwinii* Loher		✓	✓	
54. *Hoya davaoensis* Kloppenburg				✓
55. *Hoya davidcummingii* Kloppenb.		✓		
56. *Hoya densifolia* Turcz.				✓
57. *Hoya diversifolia* Blume	✓	✓		
58. *Hoya diversifolia* Blume subsp. *el-nidicus* Kloppenb.	✓		✓	
59. *Hoya eburnea* Kloppenburg, Guevarra & Carandang			✓	
60. *Hoya edanoi* C.M. Burton			✓	
61. *Hoya edwinofernandoi* Kloppenb., Cajano & Hadsall		✓		
62. *Hoya espaldoniana* Kloppenburg, Siar & Cajano		✓	✓	
63. *Hoya estrellaensis* Green & Kloppenb.			✓	
64. *Hoya ferrerasii* Kloppenb. & Siar				✓
65. *Hoya fischeriana* Warb.		✓		✓
66. *Hoya fitchii* Kloppenb. & Siar	✓	✓	✓	
67. *Hoya foxii* Kloppenburg		✓		
68. *Hoya galeraensis* Kloppenb.			✓	
69. *Hoya gigantanganensis* Kloppenb.				✓
70. *Hoya golamcoana* Kloppenb.	✓			
71. *Hoya greenii* Kloppenb.				✓

Table 1 (Continue)

Species		I	II	III	IV
72.	*Hoya halconensis* Kloppenb.			✓	
73.	*Hoya heuschkeliana* Kloppenb.		✓		
74.	*Hoya heuschkeliana* Kloppenb. subsp. *cajanoae* Kloppenb. & Siar		✓		
75.	*Hoya heuschkeliana* Kloppenb. subsp. *marionii* Kloppenburg & Ferreras		✓		
76.	*Hoya histora* Kloppenb.		✓		
77.	*Hoya ilagiorum* Kloppenb., Siar & Cajano	✓	✓	✓	
78.	*Hoya imbricata* Decne.	✓	✓	✓	✓
79.	*Hoya imbricata* Decne. subsp. *megapollinia* Kloppenb.	✓		✓	
80.	*Hoya imperialis* Lindl.			✓	
81.	*Hoya incrassata* Warb.		✓	✓	✓
82.	*Hoya isabelaensis* Kloppenb., Siar & Ferreras				✓
83.	*Hoya josephinae* J. Cabrera & Mohr			✓	
84.	*Hoya josetteae* Milton Norman Medina & Kloppenburg				✓
85.	*Hoya juannguoana* Kloppenb.	✓			
86.	*Hoya kanlaonensis* Kloppenb., Siar & Ferreras			✓	
87.	*Hoya lacunosa* Blume	✓	✓	✓	
88.	*Hoya lagunaensis* Kloppenb.		✓	✓	
89.	*Hoya lambioae* Kloppenburg, Guevarra, Cajano, & Carandang	✓		✓	
90.	*Hoya landgrantensis* Kloppenburg, Siar & Cajano		✓		
91.	*Hoya larrycahilogii* Medina & Kloppenburg				✓
92.	*Hoya lazaroi* Kloppenb. & Siar		✓		
93.	*Hoya leticiae* Kloppenb., Cajano, & Hadsall		✓		
94.	*Hoya leytensis* Elmer ex C. M. Burton				✓
95.	*Hoya linavergarae* Kloppenb. & Siar				✓
96.	*Hoya litii* Kloppenb., Siar & Cajano				✓
97.	*Hoya loheri* Kloppenb.			✓	
98.	*Hoya loheri* Kloppenb. subsp., *tanawanensis* Kloppenb., & Mendoza		✓		
99.	*Hoya lucardenasiana* Kloppenb., Siar & Cajano		✓		
100.	*Hoya lucyae* Kloppenb. & Siar			✓	
101.	*Hoya marananiae* Kloppenb., Siar, Cajano & Carandang		✓		
102.	*Hoya mariae* (Schltr.) L. Wanntorp, & Meve Willdenowia	✓	✓	✓	
103.	*Hoya martinii* Kloppenb. & Mendoza		✓		
104.	*Hoya marvinii* Kloppenb., Mendoza & Ferreras		✓		
105.	*Hoya maximowayetii* Kloppenburg			✓	
106.	*Hoya mcgregorii* Schltr.	✓			
107.	*Hoya medinae* Kloppenburg				✓
108.	*Hoya meliflua* (Blanco) Merr.	✓		✓	✓

Table 1 (Continue)

Species		I	II	III	IV
109.	*Hoya meliflua* (Blanco) Merr. subsp. *escobinae* Kloppenburg, Conda, Buot & Pitargue		✓		
110.	*Hoya meliflua* (Blanco) Merr. subsp. *fraterna* T. Green	✓		✓	✓
111.	*Hoya memoria* Kloppenb.		✓	✓	✓
112.	*Hoya merrillii* Schltr.	✓	✓	✓	✓
113.	*Hoya migueldavidii* Cabactual, Rodda & Pimentel			✓	
114.	*Hoya mindorensis* Schltr.	✓	✓	✓	✓
115.	*Hoya mindorensis* Schltr. subsp. *mendozae* Kloppenburg & Ferreras	✓		✓	
116.	*Hoya mindorensis* Schltr. subsp. *superba* Kloppenburg	✓	✓	✓	
117.	*Hoya mindorensis* Schltr. subsp. *lagyoensis* Kloppenb. & Mendoza		✓		
118.	*Hoya monetteae* T. Green			✓	
119.	*Hoya moninae* Kloppenburg & Cajano		✓		
120.	*Hoya multiflora* Blume		✓	✓	
121.	*Hoya myrmecopa* Kleijn & Donkelaar	✓		✓	
122.	*Hoya myrmecopa* Kleijn & Donkelaar subsp., *kapatalanensis* Kloppenb., Siar,Cajano, Guevarra & Carandang	✓		✓	
123.	*Hoya nakarensis* Kloppenb., Mendoza, & Ferreras		✓		
124.	*Hoya navicula* Kloppenb. & Mendoza		✓		
125.	*Hoya obscura* Elmer ex C. M. Burton		✓	✓	
126.	*Hoya odetteae* Kloppenb.		✓		✓
127.	*Hoya odorata* Schltr.	✓	✓	✓	
128.	*Hoya odorata* Schltr. subsp. *taytayensis* Kloppenb.			✓	
129.	*Hoya ormocensis* Kloppenb.				✓
130.	*Hoya palawanensis* Kloppenb.		✓		
131.	*Hoya palawanica* Kloppenb.	✓	✓	✓	
132.	*Hoya panayensis* Kloppenb. & Siar	✓			
133.	*Hoya panchoi* Kloppenb.		✓		
134.	*Hoya parvapollinia* Kloppenburg & Mendoza		✓		
135.	*Hoya paziae* Kloppenb.	✓	✓	✓	
136.	*Hoya pentaphlebia* Merr.		✓	✓	
137.	*Hoya pimenteliana* Kloppenb.		✓		
138.	*Hoya platycaulis* Simonsson & Rodda	✓	✓		
139.	*Hoya polilloensis* Kloppenb., Guevarra, G. Mend., & Ferreras		✓		
140.	*Hoya pseudoleytensis* Kloppenb., Mendoza & Carandang		✓		
141.	*Hoya pseudomaxima* Koord.		✓	✓	
142.	*Hoya pubicalyx* Merr.		✓		
143.	*Hoya pubicenta* Kloppenburg, Mendoza & Ferreras		✓		
144.	*Hoya pubicorolla* Kloppenburg, Mendoza & Ferreras		✓		

Table 1 (Continue)

Species		I	II	III	IV
145.	*Hoya pubicorolla* Kloppenburg, Mendoza & Ferreras subsp. *anthracina* Kloppenb., Mendoza & Ferreras		✓		
146.	*Hoya quinquenervia* Warb.		✓		✓
147.	*Hoya ralphdavisiana* Kloppenburg, Mendoza, & Ferreras		✓		
148.	*Hoya reyesii* M. N. Medina & Kloppenb.			✓	
149.	*Hoya rima* Kloppenburg, Mendoza & Ferreras		✓		
150.	*Hoya rosarioae* Kloppenb. & Siar		✓		
151.	*Hoya salmonea* Kloppenb., Guevarra, G. Mend. & Ferreras		✓		
152.	*Hoya salmonea* Kloppenb., Guevarra, G. Mend. & Ferreras subsp. *pallida* Kloppenb., Mendoza & Fererras		✓		
153.	*Hoya samarensis* Kloppenb. & Siar subsp. *gutierrezii* Kloppenburg		✓		
154.	*Hoya santafeensis* Kloppenb. & G. Mend.			✓	
155.	*Hoya siariae* Kloppenb.		✓		
156.	*Hoya soligamiana* Kloppenb., Siar & Cajano		✓		
157.	*Hoya sulitii* Kloppenb.			✓	
158.	*Hoya surigaoensis* Kloppenb., Siar & Nyhuus		✓		
159.	*Hoya tangerina* Kloppenb., G. Mend. & Ferreras		✓		
160.	*Hoya taytayensis* Kloppenb. & Siar			✓	
161.	*Hoya unica* Kloppenb., G. Mend. & Ferreras		✓		
162.	*Hoya unruhiana* Kloppenb., Siar, G. Mend., Cajano & Carandang		✓		
163.	*Hoya uplandgrantensis* Kloppenb.		✓		
164.	*Hoya vicencioana* Kloppenb., Siar, Cajano, Guevarra, & Carandang subsp. *quezonensis* Kloppenb.		✓		
165.	*Hoya wayetii* Kloppenb.			✓	
166.	*Hoya wibergiae* Kloppenb.	✓		✓	
167.	*Hoya wibergiae* Kloppenb. subsp. *alba* Kloppenb.	✓		✓	
168.	*Hoya williamoliveriana* Kloppenb., Cajano & Hadsall		✓		
169.	*Hoya williamsiana* Kloppenb., Siar, G. Mend., Cajano, Guevarra & Carandang		✓		
		34	99	71	34