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Is Popularity Good for Plant Conservation? Impacts of "Plantito and Plantita Culture" in Valencia City, Bukidnon, Philippines

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ABSTRACT

Commercial trading of plants is one of the most unregulated money-making industries in the world, especially in Asia. In the Philippines, many plant species, especially the endemics are already threatened of extinction. One of the threats faced by these species is the commercial trade of ornamental plants. Though prohibited under the wildlife resources conservation and protection laws, the trade persists due to their popularity in social media and local plant collectors. As such, this research aimed to quantitatively assess the illegal trade of ornamental plants in Valencia City, Bukidnon, Philippines. Specifically, it aimed to i) determine the socio-demographic profile of traders, ii) determine the species richness of the ornamental plants illegally traded, iii) determine the quantity of ornamental plant species illegally traded, iv) identify factors that drive the exploitation of the ornamental plants, and v) determine the distribution of the ornamental plants in different areas of Valencia City. The research adopted a covert research approach to monitor the plant trade activities in various street markets of Valencia City, Bukidnon. Observations and interviews have been discretely recorded using mobile phones and audio recorder to collect the data. The survey included both the wild species and cultivated ornamental plants. A total of 140 morphotypes (species, cultivars, hybrids, and varieties) belonging to 60 genera and 33 botanical families were recorded. A total of 1, 473 individual plants were recorded in five barangays of Valencia City. Aroids or arums of the Family Araceae were the most traded and collected ornamental plants with 10 genera and 48 morphotypes. This is followed by Acanthaceae (3 genera; 13 morphotypes), Asparagaceae (3 genera; 12 morphotypes), Commelinaceae (3 genera; 12 morphotypes), Euphorbiaceae (3 genera; 6 morphotypes), Orchidaceae (3 genera; 5 morphotypes) and Polypodiaceae (2 genera; 5 morphotypes).

INTRODUCTION

The COVID-19 pandemic has become a health, social, and environmental trilemma in many parts of the world. In the Philippines, this global health concern also contributes to environmental problems as marine litters (i.e., disposable facemasks) now contributes to plastic pollution with potential serious consequences on wildlife (Abreo & Kobayashi, 2021a, 2021b). Apart from the environmental problems, the lockdown, social isolation, and other negative effects of the COVID-19 restrictions, has induced public and global mental health crisis (Jakovljevic et al., 2020; Vigo et al., 2020). This led to the surge of interest in home gardening and having plants in living spaces to help reduce anxiety, depression, and other mental distress (Pérez-Urrestarazu et al., 2021; Theodorou et al., 2021; Egerer et al., 2022; Gerdes et al., 2022). This hype of collecting ornamental plants trended in the Philippines and the neologism "plantita" and "plantito" became part of the modern Filipino culture. The term "plantita" and "plantito" were the portmanteau of the words "plant" and "tita" (auntie) or "tito" (uncle) which is used to refer to people, who invest time, effort, and money in collecting and caring for plants (Canuto et al., 2020; Sunga & Advincula, 2021).

Commercial trading of plants is one of the most unregulated money-making industries in the world, especially in Asia. Yet, the commercial trade of wild-collected ornamental plants in Southeast Asia has been almost completely overlooked (Phelps & Webb, 2015). The official trade statistics in the region barely register the existence of trade in wild orchids, begonias, and other horticultural important plants (Chua et al., 2009; Phelps & Webb, 2015; Tian et al., 2018). In the Philippines, many plant species, especially the country endemics are already threatened of extinction (Department of Environment and Natural Resources, 2017). In 2008, the threatened plants in the Philippines comprises 686 taxa, 98 of which are critically endangered, 181 are endangered, 171 are vulnerable, other threatened species are 64 and 168 are other wildlife species (Fernando et al., 2008). One of the threats faced by these species is the persisting commercial wildlife trade (Phelps & Webb, 2015). The most recent Philippine-based assessment, however, showed an increase of approximately 30% in the number of threatened plants. The 2017 national list of threatened Philippine plants and their categories include 984 species; 179 species were critically endangered, 254 species were endangered, 406 species were vulnerable, and 145 species were threatened species (Department of Environment and Natural Resources, 2017).

During the lockdown due to the COVID-19 pandemic, there has been a surge of public interest in trading, collecting, and gardening. However, unfortunately, based on personal observation in the late December 2020, several ornamental plants in the trade were illegally collected from the forests. Moreover, the trade persisted even after the COVID-19 lockdown.

In this study, we explored the forgoing illegal plant trade of ornamental plants in the province of Bukidnon, particularly in Valencia City. Such information is vital to know what species are concerned, their correct names, and the extent of their exploitation. With this, the study provided additional information on the illegal plant wildlife trade and its extent. Generally, the study aimed to quantitatively assess the illegal trade of ornamental plants in Valencia City, Bukidnon, Mindanao, Philippines. Specifically, it aimed to: 1. determine the socio-demographic profile of the traders; 2. determine the species richness of the ornamental plants illegally traded in the city streets of Valencia; 3. determine the quantity of ornamental plant species illegally traded in the city streets of Valencia; and 4. identify factors that drive the exploitation of the ornamental plants; and 5. determine the distribution of the ornamental plants in different areas of Valencia City.

MATERIAL AND METHODS

Study Area

The study was conducted in the selected street markets and homegardens of Valencia City, Bukidnon, Philippines from the months of April 2021 to June 2022 (Figures 1 & 2). Since the street markets were not permanent establishments, the surveys were carried out randomly at different locations namely,

Barangay Bagontaas, Barangay Batangan, Barangay Hagkol, Barangay Lumbo, and Barangay Poblacion. The five sites were selected based on accessibility since a quarantine pass was required to enter certain barangays during the COVID-19 pandemic in compliance to the Inter-Agency Task Force (IATF) guidelines.

Figure 1. Map showing the location of Valencia City in the Province of Bukidnon, Philippines

Figure 2. Sale of ornamental plants in the streets of Valencia City, Bukidnon, Philippines

Field Surveys

Research Approach

We adopted a covert research approach which is both applied in social science (Bulmer, 1982; Calvey, 2017; Roulet et al., 2017) as well as in conservation sciences (Shepherd et al., 2016; Siriwat et al., 2019; Siriwat & Nijman, 2020; Gong et al., 2021). In this study, the respondents were not informed of the research objectives in order to document illicit or illegal activities associated with illegal gathering and/or trading of endangered plant species in the city streets, and private home gardens. The researcher pretended anonymously as potential buyer to collect the field data (i.e., plant species, prices, provenance of from the plants) and photo-documentation. Observations and interviews have been discretely recorded using mobile phones and audio recorder to collect the data.

Survey of Traded Plants

The survey included both the "wild" species and cultivated ornamental plants. Following the definition of Heywood (1999), "wild" species are defined as plants that grow simultaneously in self-maintaining populations in a natural or semi-natural habitat without direct human action. The term is contrasted with "cultivated" or "domesticated" plant species that have arisen through human action, such as selection or breeding, and that depend on management for their continued existence (Heywood, 1999). This included all the plants that were gathered (not cultivated), even those growing on cultivated lands instead of forested areas (Termote et al., 2011). As such, those that were propagated in nurseries, commercial gardens, and flower shops were excluded in this research. A field data sheet was utilized to consolidate the data. This include the life form (i.e., tree, shrub, herb, climbers), specific parts and quantities of the ornamental plants being sold (i.e., shoot, whole uprooted plant, stem cuttings, roots, bulbs, etc.), common name, street market location, and price.

Field Documentation and Plant Identification

Photographs were taken for the identification of the ornamental plants. Through this method, all plant parts can be recorded—habit, bark, wood, twigs, nodes, reproductive parts while preserving their color and complex shapes (LaFrankie & Chua, 2015). Consequently, because the study deals with illegally traded ornamental plants, generally, government permits are not required for photographs. Moreover, the shape and color are greatly modified or lost upon drying and typical specimens include only a fragment

of the living plant; such characteristics cannot be observed in herbarium specimens.

Plant photographs were then sorted, matched to collection numbers, and then copied to external storage. The sets of photographs were examined with the aim of matching the images to a known morphotypes (species, cultivar, variety, hybrid) illustrated in "A Pictorial Cyclopedia of Philippine Ornamental Plants, 3rd edition" (Madulid, 2021). The recorded plants were taxonomically verified by the authors using digitized herbariums collections, eFloras, and relevant database. The botanical nomenclature and taxonomic treatment used in this study were referred from the Kew's Plants of the World online database (http://www.plantsoftheworldonline.org/) and Co's Digital Flora of the Philippines (https://www.philippineplants.org/). The species richness was then determined by recording the number of species surveyed in the area whilst the abundance was obtained from counting the number of individuals.

RESULTS AND DISCUSSION

Socio-Demographic Profile of Plant Collectors

A total of 31 respondents were interviewed from five barangays or villages of Valencia City; 4 from Bagontaas, 7 from Batangan, 5 from Hagkol, 6 from Lumbo, and 9 from Poblacion. Most of the respondents were women (84%) while men account for 16%. The age of the respondents ranges from 20-60 years old. The 41–50-year-old age group with 10 respondents (32.26%) were the most represented group. Overall, 80% of the respondents were married, 12% reported they were single and a small percentage reported being widowed (6%). In terms of educational attainment, few individuals (3%) reached primary level, 16% attended the secondary level, and nearly half (54%) finished tertiary level. Moreover, 9 (29.03%) started to collect plants less than 5 years, timely as the pandemic had started, stating it has become their new leisure; 6 (19.36%) were plant collectors for more than 11 years making profit out of their plant collections; and 8 (25.80%) were doing it for more than 16 years. The socio-demographic profile of the respondents is summarized in Table 1.

Table 1. Socio-demographic profile of selected plant collectors in the five barangays of Valencia City, Bukidnon (n=31)

Variable	Frequency/Percentage
Gender	
Male	5 (16.13%)
Female	26 (83.87%)
Age Group	
20-30	3 (9.68%)
31-40	9 (29.03%)
41-50	10 (32.26%)
51-60	9 (29.03%)
Civil Status	
Single	4 (12.9%)
Married	25 (80.65%)
Widow	2 (6.45%)
Educational Attainment	
Elementary Level	1 (3.23%)
Elementary Graduate	1 (3.23%)
High School Level	2 (6.45%)
High School Graduate	5 (16.12%)
College Level	5 (16.12%)
College Graduate	17 (54.84%)
Years of Collecting Plants	
1-5	9 (29.03%)
6-10	8 (25.80%)
11-15	6 (19.36%)
16+	8 (25.80%)

Botanical Diversity and Quantity of Ornamental Plants

The trade of ornamental plants in Valencia City, Bukidnon, Philippines included 140 morphotypes (species, cultivars, hybrids, and varieties) belonging to 60 genera and 33 botanical families (Figure 3, Table 2).

Table 2. List of ornamental plants in selected areas of Valencia City, Bukidnon, Philippines

Family	Scientific Name	Common Name	Bagontaas	Batangan	Hagkol	Lumbo	Poblacion
A. Pteridophytes							
I. Aspleniaceae	1. *Asplenium musifolium* Mett.	Giant bird's-nest fern		1			
	2. *Asplenium nidus* L.	Bird's-nest fern	2	4	3	1	1
	3. *Asplenium nidus* 'Supreme Cobra'			1			
II. Equisetaceae	4. *Equisitum hymale* L.	Common horsetail	6	12		7	8
III. Lycopodiaceae	5. *Lycopodium clavatum* L.	Club moss	1	3		1	
IV. Polypodiaceae	6. *Microsorum musifolium*			1			1
	7. *Platycerium grande* (Feé) Sm. ex Presl	Giant staghorn fern	1	1			
V. Pteridaceae	8. *Adiantum trapeziforme* L.	Giant maidenhair fern	1	2		1	5
	9. *Pteris ensiformis* Burm. f. 'Victoriae'	Silver-leaf fern		1			1
B. Angiosperms							
VI. Acanthaceae	10. *Fittonia argentea* Hort.		3		4		
	11. *Fittonia verschaffeltii* (Lem.) Coem.	Nerve plant		6			
	12. *Fittonia verschaffeltii* var. argyroneura (Coem.) Nichols.				4		
	13. *Graptophyllum pictum* (L.) Griff 'Aurea Variegata'	Caricature plant			7		
	14. *Justicia gendarussa* Burm. f. 'Variegata'	Willow-leaved justicia					5
VI. Agavacea	15. *Chlorophytum comosum*		4		6		
	16. *Dracaena fragrans*				4		
	17. *Dracaena marginata*			4			
VII. Aloaceae	18. *Aloe barbadensis*		6	8		4	12
VIII. Apocynaceae	19. *Catharanthus roseus* (L.) G. Don	Rosy periwinkle	7			6	4
	20. *Dischidia oiantha* Schltr.	Common dischidia		2			
IX. Araceae	21. *Aglaonema commutatum* Schott. var. maculatum (Hook. f.) Nicols.		3			3	
	22. *Aglaonema commutatum* Schott 'Silver King'			7		4	3
	23. *Aglaonema commutatum* 'Tricolor' x A. nitidum 'Curtisii'			1	3	2	
	24. *Aglaonema commutatum* Schott 'Manilas Pride'	4	2			2	
	25. *Aglaonema commutatum* Schott 'Red Majesty'	3			2	4	

Table 2. (continued)

Family	Scientific Name	Common Name	Bagontaas	Batangan	Hagkol	Lumbo	Poblacion
	26. *Aglaonema commutatum* Schott 'Red Peacock'		4		3	2	
	27. *Aglaonema commutatum* Schott 'Ruby Pink'		2		2		2
	28. *Aglaonema commutatum* Schott 'Pink Dalmatian'		3	2		6	
	29. *Aglaonema commutatum* Schott 'Pink Panther'		2			3	4
	30. *Aglaonema commutatum* Schott 'Red Lipstick'		1	4	3		4
	31. *Aglaonema costatum* N.E. Br.	Spotted aglaonema	4	6			3
	32. *Aglaonema nitidum* (Jack) Kunth	Aglaonema	2	4		2	
	33. Alocasia 'Black Velvet'	Black velvet alocasia	7	25	5	2	7
	34. *Alocasia x chelsonii* Hort. Veitch			4	1	2	6
	35. *Alocasia clypeolata* Hay	Green shield alocasia	6	8			11
	36. *Alocasia cuprea* K. Koch					1	
	37. *Alocasia macrorrhizos* (L.) G. Don	Elephant's ear	4	9	3	6	14
	38. *Alocasia micholitziana* Sander	Green velvet alocasia	8	6	4	2	7
	39. *Alocasia plumbea* C. Koch ex van Houtte 'Nigra'		5	12	4	7	14
	40. *Alocasia sanderiana* Bull.	Kris plant		1			
	41. *Alocasia zebrina* C. Koch. & Hort. Veitch	Zebra alocasia	9	7	3	5	11
	42. Alocasia 'Pseudosanderiana'		4	6			8
	43. *Alocasia lauterbachiana* (Engl.) A. Hay		1	3			
	44. *Anthurium andraeanum* Lind.	Anthurium	3	6		4	2
	45. *Anthurium crystallinum* Lind. & André	Crystal anthurium	2	4	1	5	7
	46. *Anthurium plowmanii* Croat	Bird's nest anthurium				6	5
	47. Anthurium 'Renaissance'	Renaissance anthurium	7	5			3
	48. *Caladium bicolor* (Ait.) Vent.			2			5
	49. *Caladium bicolor* 'Flamingo'		3	3		4	2
	50. *Caladium bicolor* 'Pink Charm'		2	7		2	
	51. *Caladium bicolor* 'Pink Symphony'		2		4	2	5
	52. *Caladium bicolor* 'Red Flash'			2		3	3

Table 2. (continued)

Family	Scientific Name	Common Name	Bagontaas	Batangan	Hagkol	Lumbo	Poblacion
	53. *Caladium bicolor* 'Thai Beauty'		3	5		5	4
	54. *Caladium bicolor* 'White Christmas'		4	6	3	3	9
	55. *Caladium x hortulanum*	Fancy-leaved caladium	3	6			5
	56. *Dieffenbachia exotica* Hort.		10	3	1		9
	57. *Dieffenbachia maculata* (Lodd.) Sweet	Mother-in-law plant	3	12	2		
	58. *Dieffenbachia oersterdii* Schott 'Variegata'			2			4
	59. *Monstera deliciosa* Liebm.	Monstera	3	7	2	6	11
	60. *Monstera deliciosa* Liebm. 'Variegata'		2		5		8
	61. *Monstera obliqua* (Miq.) Walp.	Swiss cheese vine	1	4		3	7
	62. *Philodendron bipinnatifidum* Schott ex Endl.	Tree philodendron		2			4
	63. *Philodendron x 'Burgundy'*	Burgundy philodendron	1	1			1
	64. *Philodendron imbe* Schott ex Endl.	Bird's nest philodendron		1		1	1
	65. *Schismatoglottis wallichii*			2			3
	66. *Syngonium hoffmannii* Schott	Goosefoot		3		5	
	67. *Xanthosoma atrovirens* C. Koch & Bouche 'Albo marginatum'		1	6			4
	68. *Xanthosoma lindenii* (André) Engl. 'Magnificum'		3	2			2
X. Asparagaceae	69. *Cordyline fructicosa* (L.) A. Chev.	Ti plant			4	2	
	70. *Dracaena deremensis* Engl. 'Compacta'	Calypso queen		2		3	
	71. *Dracaena fragrans* 'Lindenii'		3				1
	72. *Dracaena reflexa* Lam. 'Song-of-India'	Song-of-India		1	6		
	73. *Dracaena sanderiana* Hort. Sander ex M.T. Mast.	Striped corn plant	1				3
	74. *Dracaena surculosa* Lindl.	Spotted dracaena				2	
	75. *Sansevieria cylindrica* Bojer	Common spearplant		2			
	76. *Sansevieria hyacinthoides* (L.) Druce	African bow hemp	6	8	4	13	4
	77. *Sansevieria masonia* Chahin.	Brother-in-law sanseviera		2			3
	78. *Sansevieria patens*			1			
	79. *Sansevieria trifasciata* Prain	Snake plant	12	26	7	8	14
	80. *Sansevieria trifasciata* Prain 'Hahnii'	Bird's nest sanseviera		1			1

Table 2. (continued)

Family	Scientific Name	Common Name	Bagontaas	Batangan	Hagkol	Lumbo	Poblacion
	80. *Sansevieria trifasciata* Prain 'Hahnii'	Bird's nest sanseviera		1			1
XI.Aquifoliacaea	81. *Ilex cornuta* Lindl. & Paxt.	English holly					2
XII. Balsaminaceae	82. *Impatiens balsamina* L.	Touch-me-not	3				6
XIII. Begoniaceae	83. *Begonia coccinea* Hook. 'Corallina de Lucerne'	Corallina de Lucerne begonia	1				
	84. *Begonia x erythrophylla* 'Bunchii'				2		
	85. *Begonia heracleifolia* Cham. & Schlectend. 'Oizumi'	Star-leaf begonia					3
	86. *Begonia imperialis* Lem.	Imperial begonia		1			5
	87 *Begonia masoniana* Irmsch.	Iron-cross begonia	1				
XIV. Bromeliaceae	88. *Aechmea caudata* Lindm. 'Variegata'		1			1	
	89. Cryptanthus 'It'		4	3			8
XV. Cactacea	90. *Epiphylum oxypetalum* (DC.) Haw.	Queen-of-the-night cactus	1				1
	91. *Selenicereus anthonyanus* (Alexander) D. Hunt		2			1	
XVI. Commelinaceae	92. *Geogenathus undatus* (C. Koch & Linden) Mildbr. & Strauss	Seersucker plant	2				4
	93. *Tradescantia pallida* (Rose) D.R. Hunt	Purple heart		1			2
	94. *Tradescantia spathacea* Sw.	Boat-of-mosses		4			5
	95. *Rhoe spathacea* 'Vittata'		1				
	96. *Tradescantia spathacea* Sw. 'Compacta'						1
	97. *Tradescantia zebrina* (Schinz) D.R. Hunt	Inch plant		6			7
XVII. Costaceae	98. *Costus speciosus* (J. Konig.) Sm.	Common spiral ginger	4				3
	99. *Costus woodsonii*			1			
XVIII. Crassulaceae	100. *Echeveria secunda* W.B. Booth			3			
XIV. Euphorbiaceae	101. *Codiaeum variegatum* (L.) Bl.	Croton	7		3		12
	102. *Codiaeum variegatum* 'Bravo'			8		5	
	103. *Codiaeum variegatum* 'Majesticum'				4		7
	104. *Codiaeum variegatum* 'Curly boy'		3		6		5
	105. *Euphorbia milii* Des Moul.	Crown-of-thorns					1
	106. *Euphorbia tirucalli* L.	Stick plant		1			2
	107. *Pedilanthus tithymaloides* (L.) Poit.	Slipper plant	4				6
	108. *Pedilanthus tithymaloides* cv.				3		

Table 2. (continued)

Family	Scientific Name	Common Name	Bagontaas	Batangan	Hagkol	Lumbo	Poblacion
XX. Gesneriaceae	109. *Episcia cupreata* (Hook.) Hanst. 'Jasper'		2		4		
	110. Episcia cupreata 'Musaica'				2		6
	111. Episcia cupreata 'Variegata'		3		5		
XXI. Labiatae/Lamiaceae	112. *Plectranthus scutellarioides* (L.) R. Br.	Coleus		2			
XXII. Leguminosae/ Fabaceae	113. *Clitoria ternatea* L.	Butterfly pea		7			4
XXIII. Marantaceae	114. *Calathea bella* (W. Bull) Regel		3	4	2	5	7
	114. *Calathea concinna*			6		2	9
	116. *Calathea makoyana* E. Morr.	Peacock plant	7	5	1	3	5
	117. *Calathea metallica* Koern. ex Regel		2				3
	118. *Calathea micans* (Mathieu) Koern.			7		4	6
	119. *Calathea ornata* (Linden) Koern. 'Roseo-lineata'		2				1
	120. *Calathea picturata* (Linden) C. Koch & Linden.		4	5		3	7
	121. *Calathea roseo-picta* (Linden) Rogel		3	1			4
	122. *Calathea stromata* Hort.		1	8		2	3
	123. *Calathea zebrina* (Sims.) Lindl.			1		1	2
	124. *Maranta arundinacea* L. var. variegata	Variegated arrowroot			3		1
	125. *Maranta bella*		4	5		3	7
	126. *Maranta leuconeura* E. Morr var. erythroneura Bunting			2			
XXIV. Melastomataceae	127. *Medinilla cummingii* Naudin			1			
XXV. Nepenthaceae	128. *Nepenthes* sp.			1			
XXVI. Nyctaginaceae	129. *Bougainvillea spectabilis* Willd.	Bougainvillea	9	13		7	21
XXVII. Orchidaceae	130. *Dendrobium anosmum* Lindl.		1				
	131. *Spathoglottis plicata* Bl.	Philippine spathoglottis	5	2			
	132. *Vanda hybrid*		4	7			3
XXVIII. Oxalidaceae	133. *Oxalis triangularis* St. Hill.	Love plant	3				5
XXIX. Piperaceae	134. *Peperomia peltifolia* C. DC.	Peltate leaf peperomia		2			1
	135. *Peperomia sandersii* A. DC.	Watermelon peperomia		5		2	

Table 2. (continued)

Family	Scientific Name	Common Name	Bagontaas	Batangan	Hagkol	Lumbo	Poblacion
XXX. Rubiaceae	136. *Hydnophytum formicarum*			1			
	137. *Ixora chinensis* Lam.	Santan	5				7
XXXI. Rosaceae	138. *Rosa florifunda*			3			4
	139. *Rosa grandiflora*						5
XXXII. Solanaceae	140. *Petunia*		11		5		8

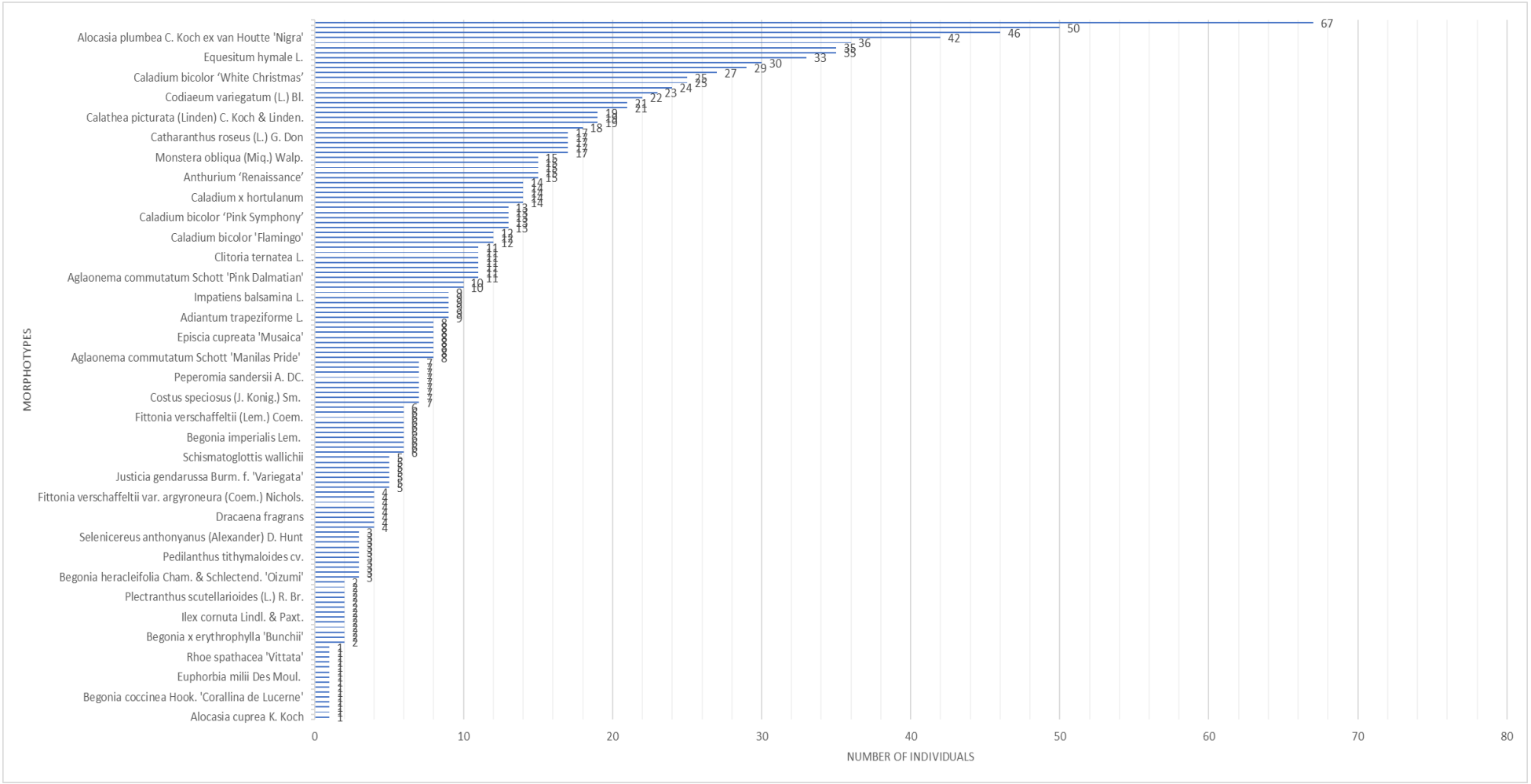

Figure 3. Abundance of ornamental plants in five selected barangays of Valencia City, Bukidnon, Philippines.

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The aroids or arum (Family Araceae) were the most traded and collected ornamental plants with 10 genera and 48 morphotypes. This is followed by Acanthaceae (3 genera; 13 morphotypes), Asparagaceae (3 genera; 12 morphotypes), Commelinaceae (3 genera; 12 morphotypes), Euphorbiaceae (3 genera; 6 morphotypes), Orchidaceae (3 genera; 5 morphotypes) and Polypodiaceae (2 genera; 5 morphotypes) (Figures 4 & 5).

A total of 1,473 individual plants were recorded in the five barangays (Figure 2). The largest collection of ornamental plants with 480 individuals (32.5%) were recorded in Poblacion. This is followed by Batangan with 410 individuals (27.8%), Bagontaas with 269 individuals (18.2%), Lumbo with 181 individuals (12.2%), and Hagkol with 133 individuals (9%). Although the number of respondents in every barangay were unequally represented and incomparable, the greatest number of plant sellers were observed in Poblacion. However, it was also observed that the location of the street market with vendors selling plants frequently changes due to the monitoring of the DENR. The inventory of ornamental plants in the five barangays of Valencia City, Bukidnon is summarized in Table 2.

The Venn diagram (Figure 6) shows the distribution of ornamental plants among the five barangays. Seven (7) ornamental plants from Bagontaas were not found among the other barangays while Batangan holds the most number having seventeen (17) ornamental plants. Whereas, Hagkol have five (5) unique ornamental plants while Lumbo and Poblacion have five to six ornamental plants unique among the others.

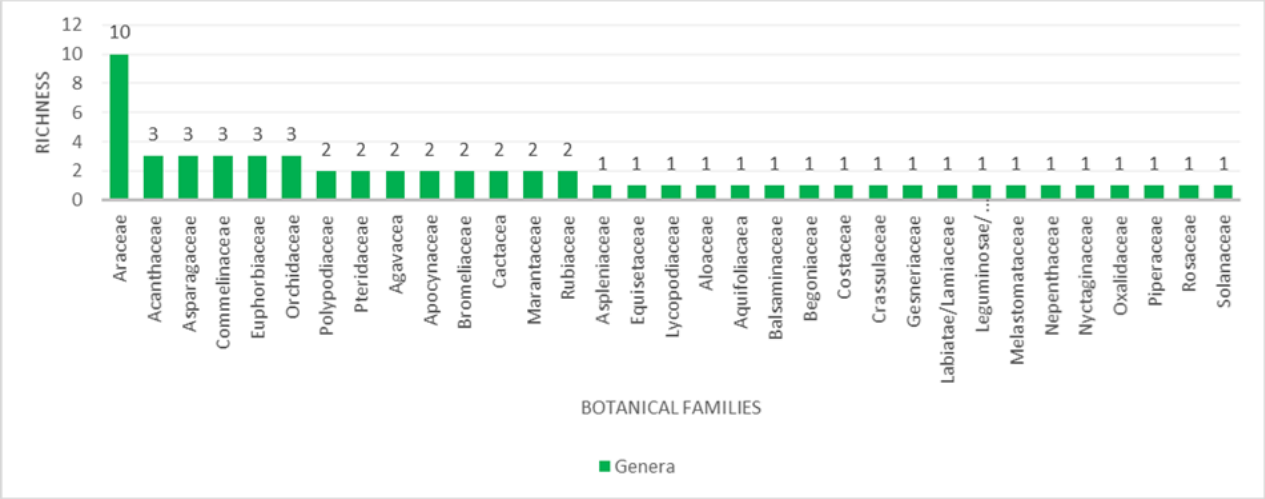

Figure 4. Number of genera in different botanical families of ornamental plant

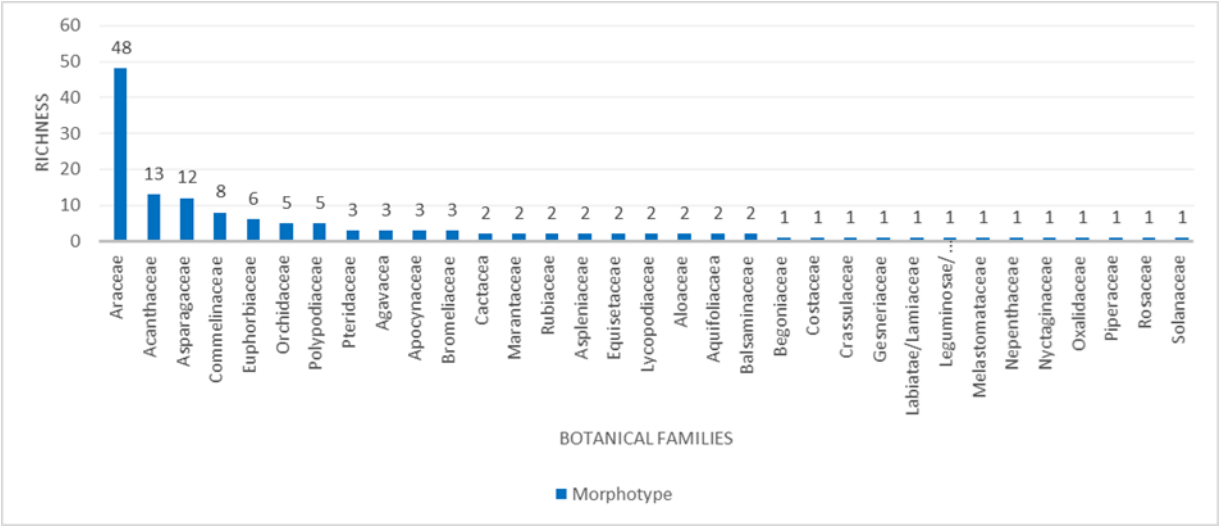

Figure 5. Morphotype richness of ornamental plants in different botanical families

Twelve (12) morphotypes were present in the five barangays (Figure 6). This includes *Asplenium nidus* L., *Alocasia micholitziana* Sander, *Sansevieria trifasciata* Prain *Calathea bella* (W. Bull) Regel, *Alocasia macrorrhizos* (L.) G. Don, *Alocasia zebrina* C. Koch. & Hort. Veitch, *Alocasia plumbea* C. Koch ex van Houtte 'Nigra', *Anthurium crystallinum* Lind. & Andre, *Sansevieria hyacinthoides* (L.) Druce, *Calathea makoyana* E. Morr., *Alocasia* 'Black Velvet', *Monstera deliciosa* Liebm.

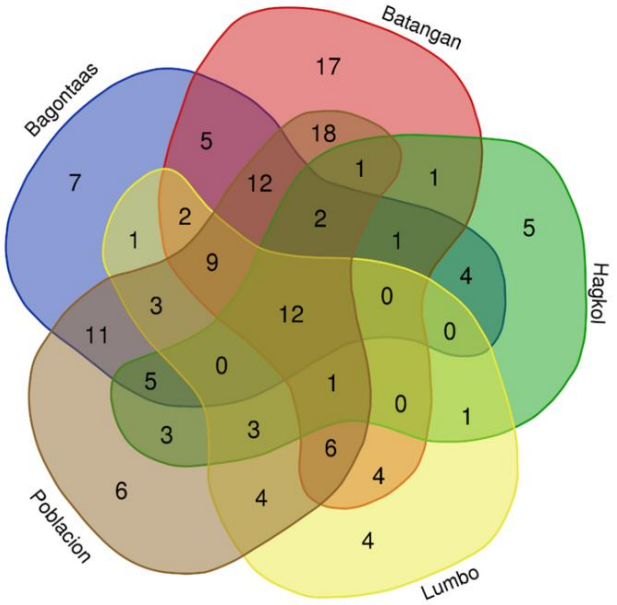

Figure 6. Venn diagram showing the distribution of ornamental plants in 5 barangays

In this study, six threatened ornamental plants were documented (Table 3). The number of threatened ornamental plants, however, may be under-represented considering the number of plant collectors who refused to be interviewed in this study.

Although orchids were among the most sought-after plant in local and international trade in Southeast Asia (Phelps & Webb, 2015; Gale et al., 2019; Williams et al., 2018; Wong & Liu, 2019), this study showed the incomparable popularity of aroids over the orchids in Valencia City. The demand for ornamental plants with aesthetically attractive foliage such as *Alocasia*, *Aglaonema*, *Anthurium*, *Caladium*, *Monstera*, and *Philodendron* may be explained by their popularity on social media. In the Philippines, the glamorized version of gardening was fueled by celebrities and social media influencers with millions of followers (Canuto et al., 2020). Some celebrities show their vast and expensive collection of flora on various social media platforms, many of which are aroids such as the variegated *Alocasia* worth 20,000 pesos (367 USD) and *Philodendron* 'Spiritus Sancti' with a price of 300,000 pesos (551 USD) (Cruz, 2020a, 2020b; Pabalate, 2020). These social media contents encouraged large audiences to develop interest in ornamental plants as well with the promise of the plantita lifestyle being a social status symbol (Canuto et al., 2020). Although there is a knowledge gap on the influence of social media influencers on plantita and plantito phenomenon, the findings of Dalangin et al. (2021) showed that trustworthy social media influencers in the Philippines can change consumers' behaviour and purchase intention. Furthermore, there is a significant relationship between the advertising effectiveness and purchase intention of consumers (Dalangin et al., 2021). Women, in particular, have a higher perception of social media influencers than male respondents because women use the internet more often (Dalangin et al., 2021).

Table 3. List of threatened ornamental plant species recorded in Valencia City, Philippines

Family	Species	Geographical Distribution	Conservation Status
Araceae	*Alocasia micholitziana* Sander	Endemic	Vulnerable (DAO 2017-11)
Araceae	*Alocasia sanderiana* W Bull.	Endemic	Critically Endangered (IUCN 2021-3) Endangered (DAO 2017-11)
Araceae	*Alocasia zebrina* Schott ex van	Endemic	Vulnerable (DAO 2017-11)
Melastomataceae	*Medinilla cumingii* Naudin	Endemic	Vulnerable (DAO 2017-11)
Nepenthaceae	*Nepenthes truncata* Macfarl.	Endemic	Endangered (IUCN 2021-3) Endangered (DAO 2017-11)
Polypodiaceae	*Platycerium grande* (Feé) Sm. ex Presl	Native	Critically Endangered (DAO 2017-11)

Table 4. Frequency distribution of responses among respondents

Perspectives of the Respondents on Plant Collection	Frequency/Percentage
Private plant collection	25 (80.64%)
I engage in barter/ exchange	24 (77.41%)
I like rare plants	17 (54.83%)
I like beautiful plants	18 (58.06%)
I like easy to grow plants	18 (58.06%)
I like highly priced plants	14 (45.16%)
I like affordable plants	14 (45.16%)
I like locally available	12 (38.70%)
I collect plants because of my beliefs	02 (6.45%)
I sell my plant collection	
Selling plants at home	09 (29.03%)
Selling online through Facebook	02 (6.45%)

The growing public interest in ornamental plants may have provided easy profit in the middle of the pandemic-driven economic recession. Yet, this also contributed to additional demand for highly-priced rare and endemic plants poached in the wild. Some of the threatened plants in Digos City, for example, were collected from the areas of Bukidnon, Sarangani, Cotabato, and Davao (Cabaobao et al., 2021). Among the threatened plants illegally collected includes orchids (i.e., *Paphiopedilum acmodontum* Schoser ex M.W. Wood, and *Vanda sanderiana* (Rchb.f.) Rchb.f.), aroids (*Alocasia micholitziana* Sander, *Alocasia sanderiana* (Schott) G.Don, and *Alocasia zebrina* Veitch ex J.Dix), giant staghorn fern (*Platycerium grande* (Fée) Kunze), different species of endemic cycads, palms, hoyas and other economic plants (Cabaobao et al., 2021). Most of the wild plants like orchids are only known to occur in certain forest ecosystems in the Philippines (Buenavista, 2017; Betanio & Buenavista, 2018).

As such, the Department of Environment and Natural Resources (DENR) issued a public warning concerning the illegal collection of wild plants which is strictly prohibited under Republic Act 9147, otherwise known as the Wildlife Resources Conservation and Protection Act (Garcia, 2020). Furthermore, DENR Department Administrative Order No. 2017-11 prohibited the collection and trade of threatened species are prohibited unless such acts are covered under a permit issued by the DENR and the species found in areas under a valid tenure instrument or a parcel of land covered by a title under the Torrens System (Garcia, 2020). In this study, six threatened ornamental plants were documented. The number of threatened ornamental plants, however, may be under-represented considering the number of plant collectors who refused to be interviewed in this study.

The illegal plant trade may be driven by the hype of having a private collection of ornamental plants (80.64%) (Table 4). This was reinforced by the public's interest in engaging in barter and exchange (77.41%) of plants for their growing collection, and the interest for collecting rare plants (54.83%). Moreover, eleven (11) individuals answered they sell the ornamental plants on their garden, eight (8) were home-based selling, two (2) through Facebook, and one (1) through a garden display. Eighteen (18) individuals stated that it was for their aesthetic value and another (18) answered "because it was easy to grow". Fourteen (14) stated that collection was based on the affordability and two (2) individuals collected because of their belief (e.g., fortune, good karma, lucky charm) (Table 4).

Accordingly, gardening positively affects an individual's source of income, livelihood, and employment opportunities (Guuroh et al., 2012; Galhena et al., 2013; Legesse et al., 2016), nutrition and health (Talukder et al., 2010), and life satisfaction and

quality of life (Soga et al., 2017). In terms of well-being, reviewed literature and studies provided positive outcomes. Ambrose et al. (2020) concluded that household gardening is strongly associated with increased emotional well-being and positive emotions such as happiness and meaningfulness. Moreover, Schmutz et al. (2014) signified that involvement in gardening promotes good mental health, reduces stress, depression, and self-harming behaviour as well as improving alertness, cognitive abilities, and social and community interactions. In the Philippines, home gardening has been a livelihood, supplementary activity, and recreation in rural and urban areas. Home gardening has been initiated even before the pandemic to address problems in different areas such as economics, food security, health, hunger, and malnutrition (National Anti-Poverty Commission & International Institute of Rural Reconstruction, 2016). During the pandemic, home gardening became a form of relief because it was associated with calling oneself productive- which refers to having high quantities of food crops grown and maximizing the use of their time in times of crisis (Montefrio, 2020). Social media users described gardening as a different form of productivity – which is being hardworking and persevering.

CONCLUSION

The trade of ornamental plants in Valencia City, Bukidnon, Philippines included 140 morphotypes (species, cultivars, hybrids, and varieties) belonging to 60 genera and 33 botanical families. This study elucidates the botanical diversity and socio-economic dimension of illegal trade of ornamental plants in Valencia City, Bukidnon. The aroids or arum (Family Araceae) were the most traded and collected ornamental plants. It is followed by Acanthaceae, Asparagacea, Commelinaceae, Euphorbiaceae, Orchidaceae, and Polypodiaceae. A total of six threatened ornamental plants were recorded in the trade. The number of threatened ornamental plants, however, may be under-represented considering the number of plant collectors who refused to be interviewed in this study. The illegal plant trade may be driven by the hype of having a private collection of ornamental plants. This was reinforced by the public's interest in engaging in barter and exchange of plants, and the interest of collecting rare plants for commercial purposes. Given its relevance in the field of conservation science, resource management, and environmental policy, this study recommends the following:

1) The local government and other concerned agency (i.e., Department of Trade Industry, Department of Environment and Natural Resources) should check and verify the source of ornamental plants marketed in Valencia City to regulate the exploitation and trade of wild plants, particularly those species harvested from the forest of Bukidnon and nearby province.
2) The different online marketing and selling platforms (i.e., Facebook marketplace, pages and groups) should be likewise monitored and reported to the proper authorities to curb the activities associated with the illegal plant trade.
3) The impact of restrictive legislation and bans (i.e., local ordinance) on the illegal wildlife trade should be revisited for more feasible and effective implementation.
4) Communication, Education and Public Awareness (CEPA) materials should also be disseminated in light of ornamental plants with threatened conservation status to promote public awareness, especially to all plant enthusiasts.

Compliance with Ethical Standards

Authors' Contributions

DPB: Manuscript design, supervision, editing.

FAB: Drafting, writing, fieldworks.

Both authors read and approved the final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical Approval

For this type of study, formal consent is not required.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author, [DP Buenavista], upon reasonable request.

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