BIODIVERSITAS
Volume 26, Number 6, June 2025
Pages: 2576-2588

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d260603

Ornamental plants in Palu City, Central Sulawesi, Indonesia

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Manuscript received: 12 December 2024. Revision accepted: 12 May 2025.

Abstract. *Sangadji MN, Ali AA, Tiwatu AF, Bilbina ZA, Cahyani R, Nugraha MAS, Ramawangsa PA, Fathurrahman, Basri Z, Pitopang R. 2025. Ornamental Plants in Palu City, Central Sulawesi, Indonesia*. *Biodiversitas 26: 2576-2588*. This research project investigating ornamental plant species in Palu City, Central Sulawesi, Indonesia, was conducted from May to September 2024. Furthermore, the main purpose was to document the diversity of ornamental plants in Palu City, Central Sulawesi, Indonesia. A botanical exploration strategy was used to observe and inventory ornamental plants in 8 districts directly. The collection and photography of all samples were conducted, followed by the identification at the Laboratory of Plant Biosystematics, Faculty of Sciences, and the Herbarium Celebense (CEB), Universitas Tadulako, Palu. Supplementary information, such as the local name, botanical name, family, and plant habitus (life form), was recorded, and then the labeled samples were deposited at CEB. The results showed a total of 264 species of ornamental plants distributed among 76 families, 197 genera, and 4 fern species, as well as 1 gymnosperm. The Euphorbiaceae family was the most extensively farmed, followed by the Arecaceae and Araceae families, with 18, 16, and 15 species, respectively. Among the 264 detected species of ornamental plants, three species were categorized under the vulnerable category of conservation status, including *Adonidia merrillii* palm (Arecaceae), *Diospyros celebica* (Ebenaceae), and *Santalum album* (Santalaceae). This research found that several ornamental plants were classified as Invasive Alien Plant Species (IAPS).

Keywords: Diversity, exploration, ornamental, Palu, plants

INTRODUCTION

Plants are essential organisms available to support the successful existence of life on this planet (Raven 2020). According to Christenhusz and Byng (2016), 31,218 of the 374,000 plant species on Earth are considered valuable (Willis and Bachman 2016). A minimum of 28,187 species are currently effective as medicines (Alkin 2017), building materials (Patti et al. 2020), vegetable sources (Kalmpourtzidou et al. 2020), and essential oil sources (Pitopang et al. 2022). More than 2,000 species serve as ornamental plants, which are categorized into various types, including floriculture crops, ornamental shrubs, trees, grasses, and bamboo. Furthermore, ornamental aquatic plants are used to adorn residential, commercial, and public spaces, both indoors and outdoors. These are commonly found in homes, offices, and buildings, as well as frequently used for special occasions, including weddings and funerals (Chen 2021).

Gardens and landscape designs use some plants for ornamental purposes, such as houseplants, cut flowers, and specimen displays. In addition, tropical, subtropical, and temperate zones are home to approximately 85,000 to 99,000 species with ornamental value, including trees, shrubs, vines, creepers, palms, ferns, orchids, grasses, bamboo, sedges, cacti, succulents, bulbs, and other flowering plants (Chowdhuri and Deka 2019).

Currently, several scientific studies exist that establish the interaction between humans and plants (Lee et al. 2015). The documented benefits of this practice include improvements in indoor air quality (Tian et al. 2023), reductions in anxiety and stress, decreases in depression, improvements in memory retention, increased happiness and life satisfaction (Hall and Knuth 2019), the ability to clean polluted air (Zhang et al. 2020), faster recovery from illness (Aslam et al. 2016), Improved relaxation, along with a notable rise in parasympathetic activity and reduction in skin conductance (Elsadek et al. 2023), and higher productivity (Bakker and van der Voordt 2010). In addition to these benefits, ornamental plants from nurseries have a significant socioeconomic impact (Rihn et al. 2023). They are highly aesthetic, contributing significantly to pollution control and enhancing the city's beauty (Das 2018).

Ornamental plants have been significant in the global market due to their ability to offer considerably higher added value in comparison to vegetables, fruits, and cereal crops. Europe, the United States, and Japan are the primary global consumers and producers of ornamental plants and cut flowers (Recasens and Alfranca 2018). The utilization of flowers and ornamental plants is associated with

emotional requirements (Huang and Yeh 2013), sentiments, standard of living, and cultural factors (Wilson et al. 2024), improved economic circumstances (Rihn et al. 2023), and sustenance (Chen and Wei 2018).

The use of ornamental plants for rehabilitation has been conducted in Palu City, Central Sulawesi, Indonesia, which is an expanding urban area experiencing tremendous growth, specifically after the 2018 earthquake. This growth has led to the establishment of numerous new residential areas, as well as the construction of public amenities, including parks. Additionally, there have been significant enhancements to transportation infrastructure and the implementation of greening projects with ornamental plants. The insufficiency of data regarding the species richness of ornamental plants suggests a need to investigate the variety present in the urban area. Therefore, this research aimed to record the species of ornamental plants, source, and status in terms of preservation and categorization as invasive or non-invasive.

MATERIALS AND METHODS

Study area

The study was carried out in Palu, the administrative capital of Central Sulawesi, Indonesia. The city has a population of 363,867 and a population density of 921 individuals per square kilometer. It is administratively divided into 8 districts and 46 subdistricts, known as "*kelurahan*" (BPS Central Sulawesi 2024). Palu was officially established as a city by Law Number 13 of 1964, and its status was later converted to an administrative city by Government Regulation Number 18 of 1978. Law number 4 of 1994 (BAPPEDA Palu City 2024) promoted the city to the rank of a municipality. The city, referred to as the 5-dimensional city, extends from east to west above the equator at coordinates 0.35-1.20 N and 120-122.90 E. The region covers a total size of 395.06 square kilometers and is situated in Palu Bay, encompassed by mountains (Figure 1). The terrain of Palu City varies from flat to hilly, with elevations ranging from 0 to 250 meters above sea level. The lowlands are predominantly located along the shore (source: https://palukota.go.id/profil/).

According to meteorological data from the Meteorology, Climatology, and Geophysics Agency (BMKG), the Sis Al-Jufri Airport Meteorological Station shows that the average air temperature in Palu City ranges from 27.1°C to 29.2°C. The lowest temperature, 21.7°C, is recorded in August, while the highest temperature, 34.9°C, is recorded in September. The lowest air humidity, 70.7%, is observed in November, while the highest air humidity, 85.9%, is observed in June. The air pressure fluctuated between 1010.9 mb and 1013.0 mb in 2019. In February, the air pressure reaches its highest point, while in November, it reaches its lowest point. The wind speed varies between 4 and 5 knots, with a northerly wind direction. In Palu City, the month of October experienced the maximum amount of rainfall, with 124.3 mm, and the lowest amount was recorded in November, with only 9.6 mm. In April, the sunshine duration reached its peak at 5.9%, whilst in July, it dropped to its lowest point at 3.7%. In April, the wind speed reached its peak at 5 knots; however, in May, it dropped to its lowest point at 3.3 knots. The wind in Palu City blows predominantly from the northeast, north, and south directions.

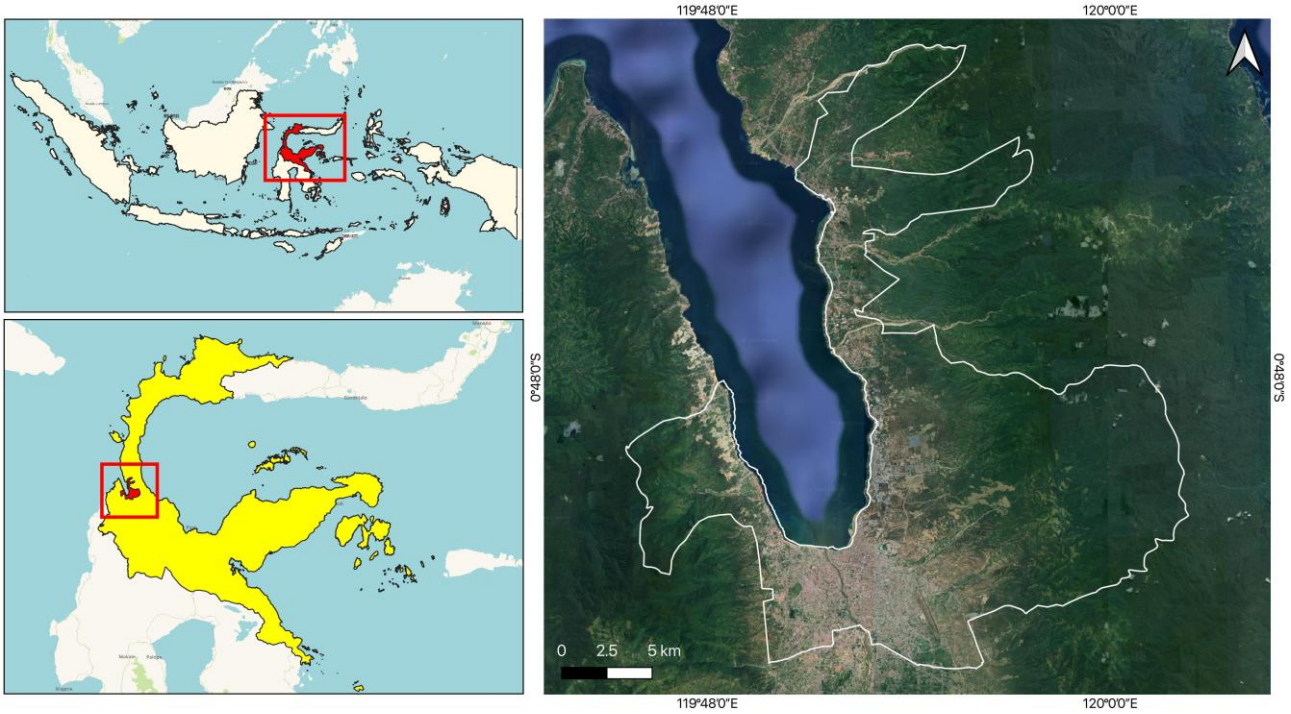

Figure 1. Map of research site, located at Palu City (square red color), the capital of Central Sulawesi, Indonesia. A. Globe; B. Palu, which has eight districts; C. Central Sulawesi. This information has been modified from a map provided by the Palu Government in 2024

Plant collection and identification

The collection of ornamental plant samples followed the methodology described by Bridson and Forman (1989). Voucher specimens were collected for all species with at least 4 duplicates and deposited in Herbarium Celebense (CEB), Universitas Tadulako, Palu, Indonesia. Subsequently, the samples were photographed and identified at the Laboratory of Plant Biosystematics, Department of Biology, Faculty of Mathematics and Natural Sciences, and the Herbarium Celebense (CEB). The specimens, together with their corresponding labels, were stored at CEB, Universitas Tadulako in Palu, Indonesia. The identification process involved comparing the sample with reference specimens and utilizing relevant literature (http://floramalesiana.org/) with the assistance of experts. Supplementary information, such as the local name, botanical name, family, and plant habitus (life form), was documented.

The species were named according to the International Plant Names Index (IPNI), and the distribution was determined using the Plants of the World Online (POWO) database from the Royal Botanic Gardens, Kew. Ornamental plants considered invasive alien plant species (IAPS) are evaluated using the criteria stated by Setyawati et al. (2015) and Tjitrosoedirdjo et al. (2016). The initial assessment of the conservation status was conducted following the guidelines of the IUCN Red List, available at the website https://www.iucnredlist.org/en. There was also the incorporation of supplementary primary and secondary databases, including http://palmweb.org/, https://compositae.landcareresearch.co.nz/, www.catalogueoflife.org/annual-checklist/2019, and https://collections.nmnh.si.edu/search/botany/. The selection criteria used were related to the accessibility of the databases, expert assessment of the comprehensiveness, and the inclusion of information on the acceptance of taxa names.

Data analyses

A descriptive statistical method was employed to analyze and describe the characteristics of the ornamental plant. The morphological characteristics and nomenclature were consistent with Stearn's (1992) and Mabberley's (2008) classifications.

RESULTS AND DISCUSSION

Species of ornamental plants, their life form, and origin

In the investigated area, there were a total of 264 species of ornamental plants belonging to 76 angiosperm and 4 fern families, as well as one gymnosperm family, all classified into 202 genera (Table 1). Euphorbiaceae is the most widely cultivated, followed by Arecaceae, Araceae, Apocynaceae, Leguminosae, Asparagaceae, Moraceae, Asteraceae, Myrtaceae, Annonaceae, Fabaceae, Lamiaceae, Poaceae, Amarylidaceae, Anacardiaceae, Bromeliaceae, Rutaceae, Zingiberaceae, Araliaceae, Cactaceae, Piperaceae, Rubiaceae, Sapindaceae, Acanthaceae, Bignoniaceae, Combretaceae, Malvaceae, Meliaceae, Orchidaceae, Oxalidaceae, Passifloraceae, Sapotaceae, and Solanaceae families with 18, 16, 15, 13, 13, 11, 9, 8, 8, 6, 6, 6, 6, 5, 5, 5, 5, 5, 4, 4, 4, 4, 4, 3, 3, 3, 3, 3, 3, 3, 3, 3, and 3 species, respectively. Meanwhile, the Amaranthaceae, Cannaceae, Commelinaceae, Crassulaceae, Heliconiaceae, Lythraceae, and Marantaceae families have 2 species each. The less common families include Araucariaceae, Boraginaceae, Caricaceae, Casuarinaceae, Clusiaceae, Cycadaceae, Cyperaceae, Ebenaceae, Equisetidaceae, Iridaceae, Lauraceae, Lecythidaceae, Moringaceae, Muntingiaceae, Nefrolepidaceae, Nelumbiaceae, Nyctaginaceae, Nymphaeaceae, Oleaceae, Pandanaceae, Phyllantaceae, Polygonaceae, Polypodiaceae, Rhamnaceae, Santalaceae, Sterculiaceae, Strelitziaceae, Talinaceae, Typhaceae, Urticaceae, and Vitaceae, each consisting of only one species. Aspleniaceae, Araucariaceae, Apiaceae, Phyllantaceae, Rhamnaceae, Santalaceae, Sterculiaceae, Talinaceae, Typhaceae, Urticaceae, Vitaceae, Pandanaceae, Nymphaeaceae, Musaceae, Muntingiaceae, and Moringaceae, each consisting of only one species.

Field observations identified the presence of 8 distinct categories of ornamental plant life forms in the research area. The most common category was trees, followed by herbs, shrubs, treelets, climbers, succulents, epiphytes, and stranglers, with 89, 77, 49, 18, 14, 9, 2, and 1 species, respectively (Figure 2).

Figure 3 shows the conservation status of each variety of ornamental plant discovered in Palu. The conservation status of medicinal plants can be classified into 9 categories: CR (Critically Endangered), DD (Data Deficient), EN (Endangered), LC (Least Concern), LR (Lower Risk), NT (Near Threatened), NE (Not Evaluated), and VU (Vulnerable) consisting of 2, 19, 5, 126, 2, 2, 105, and 3 species, respectively.

Table 1 provides comprehensive information regarding the conservation status of ornamental plants. Among the 264 observed species, only 3 falls under the VU category, including *Adonidia merrillii* palm (Arecaceae), *Diospyros celebica* (Ebenaceae), and *Santalum album* (Santalaceae). While *Araucaria subulata* and *Cajanus cajanifolius* are categorized as NT. Additionally, *Kalanchoe daigremontiana, Tectona grandis, Eucalyptus urophylla, Swietenia macrophylla,* and *Pterocarpus indicus* are classified as EN. In comparison, *Worsleya procera* and *Hyophorbe lagenicaulis* are categorized as CE.

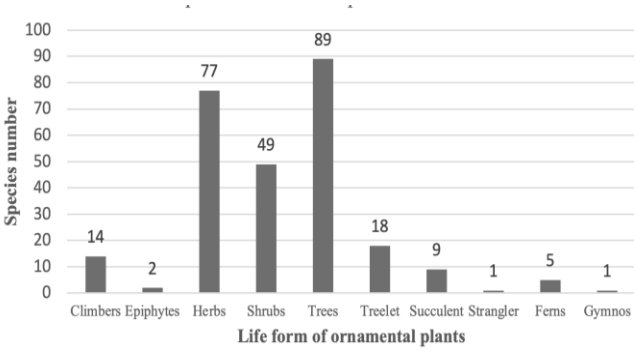

Figure 2. The life form of ornamental plants in Palu City, Central Sulawesi, Indonesia, and its number of species

Table 1. Ornamental plant species in Palu, Central Sulawesi, Indonesia, family, origin, habitus and its conservation status

Local name	Botanical name	Family	Origin	Habitus	Palu distribution								CS
					A	B	C	D	E	F	G	H	
Daun Ungu	*Graptophyllum pictum*	Acanthaceae	Papua	Shrub	●	●	●	●	●	●	●	●	NE
*Rumput Israel**	*Asystasia gangetica*	Acanthaceae	Indian Subcontinent to N. and E. Australia	Herb	●			●					NE
Gandarusa	*Rhinacanthus nasutus*	Acanthaceae	Tropical asia	Herb	●	●	●	●	●	●	●	●	NE
*Bayam Merah**	*Amaranthus hybridus*	Amaranthaceae	S. Ontario to W. South America	Herb					●		●		NE
*Jengger Ayam**	*Celosia argentea* var. *cristata*	Amaranthaceae	Tropical Africa	Herb	●			●	●	●	●		LC
Bakung	*Crinum asiaticum*	Amarylidaceae	West Asia, East Asia, Southeast Asia, Pasific	Herb	●		●		●				NE
Lily	*Crinum purpurascens*	Amarylidaceae	W. Tropical Africa to Sudan and Angola	Herb	●			●					LC
Torong	*Worsleya procera*	Amarylidaceae	Tropical America, Mexico, Argentina	Herb	●					●			CR
Lily	*Zephyranthes candida*	Amarylidaceae	SE. and S. Brazil to NE. Argentina	Herb				●					NE
Lily Hujan	*Zephyranthes rosea*	Amarylidaceae	Colombia, Peru	Herb			●	●					NE
Jambu Mete	*Anacardium occidentale*	Anacardiaceae	Trinidad to S. Tropical America	Tree			●		●		●	●	LC
Kayu Jawa	*Lannea coromandelica*	Anacardiaceae	Indian Subcontinent to China	Tree	●		●		●	●	●	●	LC
Taipa	*Mangifera indica*	Anacardiaceae	Assam to China	Tree	●	●	●	●	●	●	●	●	DD
Taipa Dodoro	*Mangifera minor*	Anacardiaceae	Lesser Sunda Islands to Papuasia	Tree	●								LC
Kedondong	*Spondias dulcis*	Anacardiaceae	E. Malesia to Santa Cruz	Tree	●				●				LC
Sirsak	*Annona muricata*	Annonaceae	S. Mexico to S. Tropical Americ	Tree	●		●				●		LC
Srikaya	*Annona squamosa*	Annonaceae	Mexico to Colombia	Tree	●	●	●		●			●	LC
Ndolia	*Cananga odorata*	Annonaceae	Indo-China to Queensland	Tree	●						●		LC
Kenanga Kecil	*Cananga odorata*	Annonaceae	Indo-China to Queensland	Tree	●								LC
Glodokan	*Monoon longifolium*	Annonaceae	India	Tree	●	●	●	●	●	●	●	●	LC
Glodokan Tinggi	*Monoon longifolium* var *pendula*	Annonaceae	India	Tree	●	●	●	●	●	●	●	●	LC
Adas	*Foeniculum vulgare*	Apiaceae	Medit. to Ethiopia, West Nepal	Herb	●				●				NE
Lengaru	*Alstonia scholaris*	Apocynaceae	Tropical and Subtropical Asia to N. Australia	Tree	●		●	●	●		●		LC
Bintaro	*Cerbera odollam*	Apocynaceae	S. India to Pacific	Tree	●	●	●	●	●		●		LC
	Wrightia pubescens	Apocynaceae	S. China, Indo-China to N. Australia	Tree	●		●	●	●		●		LC
Kamboja	*Plumeria obtusa*	Apocynaceae	Caribbean, Tropical America	Treelet	●								LC
Kamboja	*Plumeria rubra*	Apocynaceae	Central America	Treelet	●	●	●		●		●		LC
Kayu Lana	*Tabernaemontana pandacaqui*	Apocynaceae	S. China to Pacific	Treelet	●		●		●		●	●	LC
Bunga Wangi	*Tabernaemontana divaricata*	Apocynaceae	Himalaya to China	Shrub	●		●						LC
Alamanda	*Allamanda chatartica*	Apocynaceae	Tropical America, Brasil	Shrub	●			●			●		NE
Bunga Balon	*Gomphocarpus physocarpa*	Apocynaceae	S. Mozambique to S. Africa	Shrub					●				NE
Nerium	*Nerium oleander*	Apocynaceae	Mediteranian to Myanmar	Shrub	●	●	●	●	●	●	●	●	LC
Kamboja Jepang	*Adenium obesum*	Apocynaceae	Yaman	Herb	●	●	●	●	●	●	●	●	LC
Kembang Tembaga	*Catharanthus roseus*	Apocynaceae	Madagascar	Herb	●	●	●	●	●	●	●	●	NE
Bunga Hoya	*Hoya carnosa*	Apocynaceae	China to Laos, Japan	Climber				●					NE
Aglaonema	*Aglaonema simplex*	Araceae	China to Malesia	Herb	●	●							LC
Aglaonema	*Aglaonema x hybrida*	Araceae	Tropical Asia to PNG	Herb	●	●	●	●	●	●	●	●	NE
Keladi	*Alocasia macrorrhizos*	Araceae	Central Malesia to Queensland	Herb			●						NE
Bunga Flamingo	*Anthurium jenmanii*	Araceae	Colombia and Equador	Herb			●	●					NE
Gelombang Cinta	*Anthurium crystallinum*	Araceae	Colombia, Panama	Herb			●	●					NE

Gelombang Cinta	*Anthurium plowmanii*	Araceae	Per, Bolivia, Brasil	Herb		●	●					NE
Keladi 2 Warna	*Caladium bicolor*	Araceae	Central America to Argentina	Herb	●			●	●	●	●	NE
Janda Bolong	*Monstera deliciosa*	Araceae	Mexico	Herb	●		●					NE
Tanaman Dolar	*Raphidophora hayi*	Araceae	Central america	Herb	●							NE
Pohon Dolar	*Zamioculas zamiifolia*	Araceae	East Africa	Herb	●		●					NE
Sirih Gading	*Epipremnum aureum*	Araceae	Society Island	Climber	●	●	●	●	●	●	●	NE
Janda Bolong	*Monstera adansonii*	Araceae	Mexico to Tropical America	Climber	●		●					NE
Philodendron	*Philodendron bipinnatifidum*	Araceae	Ecuador	Climber	●		●					DD
Sirih Gading Perak	*Scindapsus hederaceus*	Araceae	Indo-China to W. and Central Malesia	Climber	●		●	●	●			LC
Sri Rejeki	*Dieffenbachia seguine*	Araceae	Caribbean to S. Tropical America	Herb	●	●	●	●	●	●	●	NE
Mangkokan	*Polyscias balfouriana*	Araliaceae	New Guinea, Queensland	Shrub	●			●			●	DD
Daun Cikri	*Polyscias filicifolia*	Araliaceae	New Caledonia, New Guinea	Shrub				●			●	NE
Mangkokan	*Polyscias scutellaria*	Araliaceae	Maluku, New Guinea, Santa Cruz Is., Solomon Is., Vanuatu	Shrub				●			●	LC
Pohon Payung	*Heptapleurum arboricola*	Araliaceae	Taiwan	Shrub	●	●	●	●		●		NE
Pinang	*Areca cathechu*	Arecaceae	Phillipines	Tree		●	●		●		●	LC
Kaluku	*Cocos nucifera*	Arecaceae	Pantropical	Tree	●	●	●	●	●	●	●	NE
Gebang	*Corypha utan*	Arecaceae	Andaman Islands to Assam and N. Australia	Tree							●	LC
Palem Merah	*Cyrtostachys renda*	Arecaceae	West Malesia	Tree			●		●			NE
Sawit	*Elaeis guineensis*	Arecaceae	Africa	Tree	●							LC
Kurma	*Phoenix dactylifera*	Arecaceae	Middle East	Tree	●							NE
Palem Raja	*Roystonia regia*	Arecaceae	Karibia, Tropical America	Tree	●		●	●				LC
Palem Woka	*Saribus rotundifolius*	Arecaceae	Borneo to New Guinea	Tree	●		●	●			●	NE
Pinang Ekor Bajing	*Wodyetia bifurcata*	Arecaceae	Queensland	Tree	●		●	●			●	LR
Palem Manila	*Adonidia merrillii*	Arecaceae	Borneo (Sabah) to Philippines	Tree	●	●	●	●				VU
Palem Botol	*Hyophorbe lagenicaulis*	Arecaceae	Mauritius	Tree	●	●	●	●				CR
Palm Segitiga	*Chrysalidocarpus decaryi*	Arecaceae	Madagascar	Tree	●		●					NE
Palem Bismarck Perak	*Bismarckia nobilis*	Arecaceae	Endemic to Madagascar	Treelet	●			●				LC
Palem Ruang Tamu	*Chamaedorea elegans*	Arecaceae	Mexico to Honduras	Treelet	●							NE
Palem Kipas	*Licuala grandis*	Arecaceae	Santa Cruz Islands to Vanuatu	Shrub	●							NE
Palem	*Rhapis excelsa*	Arecaceae	China to Central Vietnam	Shrub	●		●					NE
Suji	*Dracaena angustifoli*a	Asparagaceae	Tropical and Subtropical Asia to N. Australia	Treelet	●	●	●	●	●	●	●	NE
Hanjuang	*Cordyline fruticosa*	Asparagaceae	Papuasia to W. Pacific	Shrub	●	●	●	●	●	●	●	LC
Lidah Mertua	*Dracaena angolensis*	Asparagaceae	S. Tropical Africa	Shrub	●		●	●				NE
Lidah Mertua	*Dracaena arborea*	Asparagaceae	W. Tropical Africa to Angola	Shrub	●	●		●	●		●	LC
Lidah Mertua	*Dracaena reflexa* var. *angustifolia*	Asparagaceae	W. Indian Ocean	Shrub	●		●	●				LC
Lidah Mertua	*Dracaena reflexa* var. *salicifolia*	Asparagaceae	NE. Mozambique, W. Indian Ocean	Shrub	●						●	LC
Dracaena Tutul	*Dracaena surculosa*	Asparagaceae	W. Central Tropical Africa	Shrub	●		●				●	NE
Lidah Ibu Mertua	*Dracaena trifasciata*	Asparagaceae	Nigeria to Central Africa	Herb	●	●	●	●	●	●	●	NE
Agave	*Agave americana*	Asparagaceae	Tropical America	Herb	●		●	●			●	LC
Bunga Laba-Laba	*Chlorophytum comosum*	Asparagaceae	Tropical Africa to Cameroon, Ethiopia to South Africa	Herb			●					LC
Naga Daun Lebar	*Dracaena aletriformis*	Asparagaceae	SE. Kenya to S. Africa.	Herb	●		●	●				LC
Daun Diabetes	*Gymnanthemum amygdalinum*	Asteraceae	E. Bolivia to Brazil, Tropical Africa, W. Yem	Shrub	●	●	●	●	●	●	●	NE
Bunga Aster	*Aster indamellus*	Asteraceae	Central Himalaya to W. Tibet	Herb	●		●			●		NE
Kenikir	*Cosmos caudatus*	Asteraceae	Tropical america	Herb	●	●	●	●			●	NE

Bunga Matahari	*Helianthus annuus*	Asteraceae	Central America	Herb	●		●			●		LC
Tahi Ayam	*Tagetes erecta*	Asteraceae	Mexico, Guatemala	Herb	●	●	●	●		●		NE
*Bunga Matahari Kecil**	*Tithonia diversifolia*	Asteraceae	Mexico to Central America	Herb						●		NE
Bunga Lilin	*Zinnia elegans*	Asteraceae	Mexico to Nicaragua	Herb	●		●	●				NE
Lee Kwan Yeu	*Tarlmounia elliptica*	Asteraceae	China to Malaya	Climber	●	●	●	●	●	●	●	NE
Lonceng Kuning	*Tecoma stans*	Bignoniaceae	Tropical and Subtropical America	Tree			●			●		LC
Tabebuya	*Handroanthus chrysotrichus*	Bignoniaceae	Brasil to Argentina	Tree	●		●		●	●		NE
*Tulip Afrika**	*Spathodea campanulata*	Bignoniaceae	Tropical Africa, Uganda, Angola	Tree	●		●					LC
Cordia Merah	*Cordia subcordata*	Boraginaceae	S. Somalia to N. Mozambique, W. Indian Ocean to Pacific.	Tree				●	●	●		LC
	Aechmea dichlamydea	Bromeliaceae	Trinidad-Tobago, Venezuela	Herb				●	●			NE
Nenas	*Ananas comosus*	Bromeliaceae	Tropical America	Herb	●			●	●			NE
Obor Menyala	*Billbergia pyramidalis*	Bromeliaceae	Windward Islands to N. and E. Brazil	Herb	●			●	●			NE
	Tillandsia schiedeana	Bromeliaceae	Tropical America	Herb				●	●			NE
Janggut Musa	*Tillandsia usneoides*	Bromeliaceae	Tropical America	Herb				●				LC
Kaktus Koboi	*Cereus repandus*	Cactaceae	South Caribbean, Venezuela to Colombia	Succulent	●			●	●			LC
Buah Naga	*Selenicereus monacanthus*	Cactaceae	Nicaragua to Trinidad and Peru	Succulent	●		●			●		NE
Kaktus	*Opuntia cochenillifera*	Cactaceae	Central America	Succulent	●		●			●		DD
Kaktus	*Opuntia elatior*	Cactaceae	South America	Succulent	●							LC
Tasbih	*Canna × hybrida*	Cannaceae	Somalia	Herb	●		●	●				NE
Tasbih	*Canna indica*	Cannaceae	Tropical and Subtropical America	Herb	●		●	●				NE
Pepaya	*Carica papaya*	Caricaceae	Tropical Asia	Tree	●	●	●	●	●	●	●	DD
Cemara Laut	*Casuarina equisetifolia*	Casuarinaceae	Australia	Tree	●		●		●	●		LC
Donggala	*Calophyllum inophyllum*	Clusiaceae	Kenya, W. Indian Ocean, Tropical Asia to Pacific.	Tree		●						LC
Ketapang	*Terminalia catappa*	Combretaceae	Southeast Asia	Tree	●	●	●	●	●	●	●	LC
Ketapang Kencana	*Terminalia mantaly*	Combretaceae	Madagascar	Tree	●	●	●	●	●	●	●	LC
Cenguk	*Combretum indicum*	Combretaceae	Myanmar	Shrub	●		●			●		LC
Adam Dan Hawa Dalam Perahu	*Tradescantia spathacea*	Commelinaceae	Mexico to Guatemala	Herb	●		●		●	●		NE
Ungu Hati	*Tradescentia pallida* var *purpurea*	Commelinaceae	Mexico	Herb	●		●		●	●		NE
Cocor Bebek Banyak Anak	*Kalanchoe daigremontiana*	Crassulaceae	SW. Madagascar	Succulent	●		●	●				EN
Siranindi	*Kalanchoe pinnata*	Crassulaceae	Madagascar	Succulent	●				●			NE
Sikas	*Cycas revoluta*	Cycadaceae	China Southeast, Japan,Taiwan	Treelet	●					●		LC
Rumput Baling Baling	*Cyperus alternifolius*	Cyperaceae	Australia	Herb	●							LC
Kayu Hitam/ Ebony	*Diospyros celebica*	Ebenaceae	Endemic Sulawesi	Tree	●		●	●		●		VU
Kemiri	*Aleurites molucanus*	Euphorbiaceae	Indochina, Soutrheast Asia, PNG, North Australia	Tree	●							LC
Pohon Manohara	*Hura crepitans*	Euphorbiaceae	Tropical America	Tree	●	●	●	●	●	●	●	LC
Singkong Karet	*Manihot carthagenensis*	Euphorbiaceae	Caribia, Brasil	Treelet	●		●		●		●	LC
*Jarak**	*Ricinus communis*	Euphorbiaceae	Tropical Africa	Treelet	●				●		●	NE
	Acalypha wilkesiana	Euphorbiaceae	Bismarck Archipelago	Shrub			●					LC
Puring	*Codiaeum variegatum*	Euphorbiaceae	East Malesia, PNG	Shrub	●	●	●	●	●	●	●	LC
Patah Tulang	*Euphorbia tirucalli*	Euphorbiaceae	Madagascar	Shrub	●		●			●		LC
*Jarak Merah**	*Jatropha gossypiifolia*	Euphorbiaceae	Mexico to Tropical America	Shrub	●	●	●	●	●	●	●	LC
Peregrina	*Jatropha integerrima*	Euphorbiaceae	W. Cuba	Shrub	●			●				LC
Tanaman Yodium	*Jatropha multifida*	Euphorbiaceae	Mexico, Carribean	Shrub	●					●		LC

Jarak Bali	*Jatropha podagrica*	Euphorbiaceae	S Mexico, Nicaragua	Shrub	●						●	NE
Ekor Kucing Merah	*Acalypha hispida*	Euphorbiaceae	Bismarck Archipelago	Herb	●		●					NE
Mahkota Duri	*Euphorbia milii*	Euphorbiaceae	Madagascar	Herb			●					LC
*Balacai**	*Jatropha curcas*	Euphorbiaceae	Tropical America	Herb	●	●	●	●	●	●	●	●	LC
Bunga Pangkas	*Pedilanthus tithymaloides*	Euphorbiaceae	Florida, Mexico to Tropical America	Herb	●		●		●		●		LC
Kaktus Susu	*Euphorbia lactea*	Euphorbiaceae	Sri Lanka	Succulent	●		●	●					DD
Sudu-Sudu	*Euphorbia neriifolia*	Euphorbiaceae	Myanmar	Succulent	●			●			●		LC
Kaktus Susu	*Euphorbia trigona*	Euphorbiaceae	Gabon to Malawi	Succulent	●		●		●				DD
Kembang Merak	*Caesalpinia pulcherrima*	Fabaceae	Mexico, Central America	Tree	●	●	●	●	●	●	●	●	LC
Dadap Merah	*Erythrina crista-galli*	Fabaceae	Brazil to N. Argentina	Tree	●								LC
Turi	*Sesbania grandiflora*	Fabaceae	South Asia, South East Asia	Tree	●				●				DD
Bunga Kupu-Kupu	*Bauhinia purpurea*	Fabaceae	India, Myanmar	Treelet	●		●	●					LC
Bunga Kupu Kupu Putih	*Bauhinia racemosa*	Fabaceae	Indian Subcontinent to China and Indo-China	Treelet	●				●				LC
Bunga Telang	*Clitoria ternatea*	Fabaceae	Cape Verde, Tropical and S. Africa, Arabian Peninsula	Climber	●	●	●	●	●	●	●	●	NE
Heliconia	*Heliconia acuminata*	Heliconiaceae	Tropical America	Herb					●				NE
Sepit Udang	*Heliconia latispatha*	Heliconiaceae	Mexico to Tropical America	Herb	●		●						NE
Bawang Dayak	*Eleutherine bulbosa*	Iridaceae	Caribbean to S. Tropical America.	Herb			●						NE
Jati Putih	*Gmelina arborea*	Lamiaceae	Pakistan to China and N. Indo-China	Tree	●				●				LC
Jati	*Tectona grandis*	Lamiaceae	Southeast Asia	Tree	●			●			●		EN
	Clerodendrum thomsoniae	Lamiaceae	W. Tropical Africa to Cameroon	Shrub	●								NE
Cincau Hijau	*Premna trichostoma*	Lamiaceae	Indo-China to New Guinea	Shrub	●								LC
Mayana	*Coleus scutellarioides*	Lamiaceae	Indo-China to Nansei-shoto and N. Australia	Herb	●	●	●	●	●	●	●	●	NE
Kemangi	*Ocimum basilicum*	Lamiaceae	Tropical and Subtropical Asia to N. Australia	Herb	●	●	●	●	●	●	●	●	NE
Alpukat	*Persea americana*	Lauraceae	Tropical America	Tree	●		●				●		LC
Bitung	*Barringtonia asiatica*	Lecytidaceae	NE. Tanzania, Indian Ocean to Pacific.	Tree	●		●						LC
Bunga Kupu-Kupu	*Bauhinia variegata*	Leguminosae	Bangladesh, Himalaya, India	Tree	●		●						LC
Trengguli	*Cassia fistula*	Leguminosae	India, Myanmar	Tree	●								LC
	Cassia javanica	Leguminosae	Southeast Asia	Tree	●								LC
Flamboyan	*Delonix regia*	Leguminosae	Madagascar	Tree	●		●	●					LC
Gamal	*Gliricidia sepium*	Leguminosae	Mexico	Tree	●				●		●	●	LC
Lamtoro	*Leucaena leucocephala*	Leguminosae	Mexico, Central America	Tree	●	●	●	●	●	●	●	●	CD
Angsana	*Pterocarpus indicus*	Leguminosae	Tropical Asia	Tree	●		●	●			●		EN
Trembesi	*Samanea saman*	Leguminosae	Central America	Tree	●	●	●	●	●	●	●	●	LC
*Johar**	*Senna siamea*	Leguminosae	Srilanka	Tree	●	●	●	●	●	●	●	●	LC
Turi	*Sesbania sesban*	Leguminosae	Tropical Africa	Tree	●				●				LC
Asam	*Tamarindus indica*	Leguminosae	Madagascar	Tree	●	●			●		●	●	LC
Kembang Merak	*Caesalpinia pulcherrima*	Leguminosae	Mexico, Central America	Shrub	●	●	●	●	●	●	●	●	LC
Kacang Kayu	*Cajanus cajanifolius*	Leguminosae	Assam, India	Shrub	●		●						NT
Delima	*Punica granatum*	Lythraceae	Turkey, Pakistan	Tree	●	●	●				●		LC
Kolontigi	*Lawsonia inermis*	Lythraceae	NE. Tropical Africa, Arabian Peninsula, S. Pakistan	Shrub	●		●	●					LC
Gedi	*Abelmoschus manihot*	Malvaceae	Tropical and Subtropical Asia to NE. Australia	Treelet	●						●		DD
Kembang Sepatu	*Hibiscus rosa-sinensis*	Malvaceae	East Asia	Shrub	●		●						NE
Waru	*Hibiscus tiliaceus*	Malvaceae	Tropics and Subtropics	Tree	●	●	●		●	●	●	●	LC
Bomba	*Donax canniformis*	Marantaceae	Taiwan), Indo-China to W. Pacific	Herb				●			●		NE
Bunga Berdoa	*Goeppertia ornata*	Marantaceae	SE. Colombia to SW. Venezuela	Herb				●					NE

Mimba	*Azadirachta indica*	Meliaceae	India, Southeast Asia	Tree	●			●				LC
Mindi	*Melia azedarach*	Meliaceae	Tropical Asia	Tree	●		●		●			LC
Mahoni	*Swietenia macrophylla*	Meliaceae	Mexico, Central America	Tree	●	●	●	●	●	●	●	EN
Sukun/Kamonji	*Artocarpus altilis*	Moraceae	North West Pasific	Tree	●	●	●		●			NE
Nangka/Ganaga	*Artocarpus heterophylla*	Moraceae	India	Tree	●	●	●	●	●	●	●	NE
Beringin	*Ficus benjamina*	Moraceae	Tropical Asia	Tree	●	●		●	●		●	LC
Tin	*Ficus carica*	Moraceae	E. Medit. to Central Asia and Afghanistan.	Tree	●		●	●		●	●	LC
Karet Merah	*Ficus elastica*	Moraceae	Nepal to China (W. Yunnan) and W. Malesia	Treelet	●			●	●			LC
Murbai	*Morus alba*	Moraceae	China and India	Treelet	●			●				LC
Serut	*Streblus asper*	Moraceae	Tropical Asia,	Treelet	●		●	●	●			LC
Tagalolo	*Ficus septica*	Moraceae	Malesia, North Australia	Herb	●				●		●	●	LC
Pohon Dolar	*Ficus microcarpa*	Moraceae	Tropical Asia, China, Taiwan, Pasific	Strangler			●					LC
Kelor	*Moringa oleifera*	Moringaceae	Pakistan, India	Tree	●	●	●	●	●	●	●	●	LC
Kersen	*Muntingia calabura*	Muntingiaceae	Mexico, Tropical America	Tree	●	●	●	●	●	●	●	●	LC
Pisang Kipas	*Ravenala madagascariensis*	Strelitziaceae	Madagascar	Herb	●			●					LC
Eucalytus	*Eucalyptus urophylla*	Myrtaceae	Lesser Sunda	Tree	●			●					EN
Kayu Putih	*Melaleuca leucadendra*	Myrtaceae	Maluku to N. Australia	Tree	●								DD
*Jambu Biji**	*Psidium guajava*	Myrtaceae	Tropical America	Tree	●		●	●					LC
Jambu Air	*Syzygium aqueum*	Myrtaceae	Southeast Asia	Tree	●		●	●					LC
*Jembolan**	*Syzygium cumini*	Myrtaceae	Tropical Asia	Tree	●		●				●		LC
Jambu Bol	*Syzygium malaccense*	Myrtaceae	Indo-China to Vanuatu	Tree	●	●	●		●		●		LC
Pucuk Merah	*Syzygium myrtifolium*	Myrtaceae	Southeast Asia	Tree	●	●	●	●	●	●	●	●	NE
Daun Salam	*Syzygium polyanthum*	Myrtaceae	Indo-China, West Central Malesia	Tree	●				●		●		NE
Lotus	*Nelumbo nucifera*	Nelumbonaceae	Ukraine to N. Iran, Russian Far East to Tropical Asia, N. and N E. Australia	Herb	●								DD
Bunga Kertas	*Bougainvillea spectabilis*	Nyctaginaceae	S and E Brasil	Shrub	●	●	●	●	●	●	●	●	NE
Teratai	*Nymphaea nouchali*	Nymphaeaceae	Tropical and Subtropical Old World to N. Australia	Herb	●			●					LC
Melati Putih	*Jasminum sambac*	Oleaceae	Buthan to India	Shrub	●			●					NE
Anggrek	*Cymbidium finlaysonianum*	Orchidaceae	Indo-China to Malesia.	Herb	●			●	●				NE
Anggrek Merpati	*Dendrobium crumenatum*	Orchidaceae	Taiwan to Tropical Asia	Epiphyte				●					NE
Anggrek Bulan	*Phalaenopsis amabilis*	Orchidaceae	Malesia to North East Australia	Epiphyte				●					NE
Belimbing Wuluh	*Averrhoa bilimbi*	Oxalidaceae	Central and E. Malesia	Tree	●		●						LC
Belimbing	*Averrhoa carambola*	Oxalidaceae	Central and E. Jawa to Maluku	Tree	●								DD
Bunga Kupu-Kupu	*Oxalis triangularis*	Oxalidaceae	Peru to Brazil, North Argentina	Herb				●					NE
Pandan Wangi	*Pandanus amarylifollius*	Pandanaceae	Maluku	Herb	●		●				●		DD
*Markisa**	*Passiflora edulis*	Passifloraceae	Brazil to NE. Argentina	Climber	●								NE
Bunga Keranjang@	*Passiflora foetida*	Passifloraceae	Tropical and Subtropical America	Climber	●	●	●	●	●	●	●	●	NE
Bunga Gairah Yg Wangi	*Passiflora vitifolia*	Passifloraceae	Central and South America	Climber			●						NE
Katu	*Breynia androgyna*	Phyllantaceae	Tropical and Subtropical Asia	Shrub	●								LC
Peperomia Melon	*Peperomia argyraea*	Piperaceae	Brasil	Herb				●		●			NE
Peperomia Hijau	*Peperomia obtusifolia*	Piperaceae	Florida to Tropical America.	Herb				●					NE
Sirih	*Piper betle*	Piperaceae	Indo-China to Malesia.	Climber	●			●					NE
Sirih Merah	*Piper ornatum*	Piperaceae	Sulawesi	Climber	●			●					NE
Bambu Kuning	*Bambusa vulgaris*	Poaceae	China, Indo-china	Shrub	●								NE
Bambu Putih	*Bambusa glaucophylla*	Poaceae	Jawa	Shrub			●	●					NE

Sereh	*Cymbopogon citratus*	Poaceae	India, Sri Lanka	Herb	●	●		●	●		●		NE
Tebu	*Saccharum officinarum*	Poaceae	New Guinea	Herb	●			●					NE
Bambu Siam	*Thyrsostachys siamensis*	Poaceae	Southeast Asia	Herb	●			●					NE
Jagung	*Zea mays*	Poaceae	Guatemala, Mexico Central, Mexico Southwest	Herb	●		●						LC
Air Mata Pengantin	*Antigonon leptopus*	Polygonaceae	Mexico to Central America	Shrub	●		●	●					NE
*Bunga Pukul Sembilan**	*Portulaca grandiflora*	Portulacaceae	Peru, Brasil, Argentina	Herb	●	●	●	●					NE
Bunga Pukul Sembilan	*Portulaca oleracea*	Portulacaceae	Macaronesia, Tropical Africa, Medit. to Pakistan	Herb			●						LC
Bidara	*Ziziphus mauritiana*	Rhamnaceae	African Sahara to Sahel to Tanzania, S. Iran to Australia.	Treelet	●	●	●	●	●	●	●	●	LC
Mawar	*Rosa gallica*	Rosaceae	Medit. to E. Central and E. Europe	Shrub	●			●			●		DD
Mawar	*Rosa pendulina*	Rosaceae	Europe to Kazakhstan	Shrub	●		●	●					LC
Soka	*Ixora javanica*	Rubiaceae	Java	Shrub	●	●	●	●	●	●	●	●	LC
Mengkudu	*Morinda citrifolia*	Rubiaceae	Andaman, Southeast Asia	Shrub	●		●	●	●				LC
Nusaindah	*Mussaenda frondosa*	Rubiaceae	Indian Subcontinent to Caroline Islands	Shrub	●		●						NE
Daun Putri	*Mussaenda phillipica*	Rubiaceae	Phillipines	Shrub	●	●	●	●					LC
Jeruk Nipis	*Citrus aurantifolia*	Rutaceae	India	Tree	●		●	●	●	●	●		NE
Lemon Cui	*Citrus x microcarpa*	Rutaceae	Artificial hybrid	Tree	●								NE
Zodia	*Evodia suaveolens*	Rutaceae	Papua	Treelet	●								NE
	Melicope latifolia	Rutaceae	Kalimantan, Sulawesi, Papua, Maluku	Treelet	●				●				LC
Kemuning	*Murraya paniculata*	Rutaceae	Tropical and Subtropical Asia to Vanuatu	Shrub	●								NE
Cendana	*Santalum album*	Santalaceae	Jawa to N. Australia	Tree	●								VU
Lengkeng	*Dimocarpus longan*	Sapindaceae	Southeas Asia	Tree	●		●						DD
Kerai Payung	*Filicium decipiens*	Sapindaceae	SE. Ethiopia to Mozambique, Comoros, Madagascar, SW. India, Sri Lanka	Tree	●	●	●	●	●		●		LC
Matoa	*Pometia pinnata*	Sapindaceae	Sri Lanka, China to South Pacific	Tree	●		●						LC
Rambutan	*Nephelium lappaceum*	Sapindaceae	Thailand to W. Malesia	Tree	●		●			●			LC
Sawo Kecik	*Manilkara kauki*	Sapotaceae	Indo-China to N. Queensland	Tree	●								DD
Sawo Manila	*Manilkara zapota*	Sapotaceae	Central America	Tree	●		●	●					LC
Tanjung	*Mimusops elengi*	Sapotaceae	Andaman to Southeast Asia	Tree	●	●	●	●	●	●	●	●	LC
Rica	*Capsicum annuum*	Solanaceae	Central Mexico	Shrub	●								LC
Rica Rawit	*Capsicum fructescen*	Solanaceae	S. Mexico to Tropical America	Shrub	●			●	●		●		LC
Terung	*Solanum melongena*	Solanaceae	India, Sri Lanka	Herb	●								NE
Balaroa	*Kleinhovia hospita*	Sterculiaceae	South East Asia	Tree		●	●				●		LC
Ginseng	*Talinum paniculatum*	Talinaceae	Tropical America	Herb	●			●					LC
*Typha**	*Typha angustifolia*	Typhaceae	Temp. Northern Hemisphere	Herb			●	●					LC
Bunga Bertobat	*Procris repens*	Urticaceae	China to Tropical Asia.	Climber	●			●					NE
Bunga Pangkas	*Duranta erecta*	Verbenaceae	Tropical America	Shrub	●	●	●	●	●	●	●	●	LC
*Bunga Tahi Ayam**	*Lantana camara*	Verbenaceae	Bolivia to Brazil and N. Argentina	Shrub	●		●	●					NE
Anggur	*Vitis vinifera*	Vitaceae	Mediterania, Middle Europe, Marocco, Portugal	Climber	●	●	●	●	●	●	●	●	LC
Lengkuas	*Alpinia galanga*	Zingiberaceae	S. China to W. and Central Malesia	Herb	●	●	●	●	●	●	●	●	LC
Temu Hitam	*Curcuma aeruginosa*	Zingiberaceae	Bangladesh to W. Malesia	Herb	●								LC
Kunyit	*Curcuma longa*	Zingiberaceae	India	Herb	●	●	●	●	●	●	●	●	DD
Temulawak	*Curcuma zanthorrhiza*	Zingiberaceae	SW India	Herb	●				●		●		DD
Jahe	*Zingiber officinale*	Zingiberaceae	India to S. Central China	Herb	●				●				DD
Suplir	*Adiantum peruvianum*	Pteridaceae	Ecuador to Bolivia	Fern	●			●					NE
Suplir	*Adiantum raddianum*	Pteridaceae	Tropical America	Fern	●			●					NE

Tanduk Mejangan	*Platycerium bicurfatum*	Polypodiaceae	Tropical Asia, Africa, Australia	Fern				●	NE
Pakis	*Nephrolepis biserrata*	Nefrolepidaceae	Tropical America, Asia, Africa	Fern	●			●	NE
Paku Ekor Kuda	*Equisetum ramosissimum*	Equisetaceae	India, China, South East Asia, PNG, Pasific	Fern	●				LC
Pohon Pinus	*Araucaria subulata*	Araucariaceae	South East New Caledonia	Tree	●		●	●	NT

Note: Palu Distribution: A: Mantikulore; B: West Palu; C: South Palu; D: East Palu; E: North Palu; F: Tatanga; G: Tawaeli; H: Ulujadi. RC: Redlist Category: NA: Not Applicable; NE: Not Evaluation; DD: Data Deficient; LC: Least Concern; NT: Near Threatened; VU: Vulnerable; EN: Endangered; CR: Critically Endangered; RE: Regional Extinct; EW: Extinct in the Wild; EX: Extinct. *: Invasive Alien Plant Species (IAPS) according to Setyawati et al. (2015); Tjitrosoedirdjo et al. (2016)

The introduction of several species of ornamental plants was observed in the research area in Indonesia (Figure 4). The neotropics have the highest contribution of 84 species (31.82%), followed by 41 African species (15.53%), 37 Indian species (14.02%), 9 Polynesian species (3.41%), and the remaining species are from Australian, Euro-Siberian, and East Asian flora. In Southeast Asia (Malesian), a total of 66 native plant species accounted for 25% of the flora. In the Wallacea area, there are only 3 native plant species, constituting 1.14% of the flora. The following ornamental plants have been identified as IAPS, namely *Jatropha curcas, Jatropha gossypiifolia, Passiflora edulis, Passiflora foetida, Psidium guajava, Senna siamea, Tithonia diversifolia, Typha angustifolia, Syzygium cumini*, and *Spathodea campanulata*. IAPS refers to the accidental or international introduction of plants into natural areas where the species are not found, but severe adverse effects can occur in the new environment.

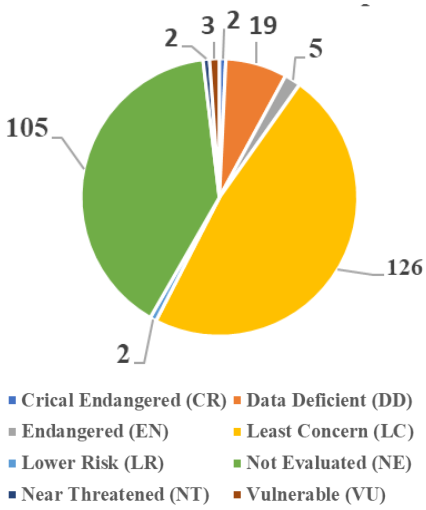

Figure 3. Conservation status of ornamental plants in Palu City, Central Sulawesi, Indonesia. CR: Critically Endangered; DD: Data Deficient; EN: Endangered; LC: Least Concern; LR: Lower Risk; NE: Not Evaluated; NT: Near Threatened; VU: Vulnerable

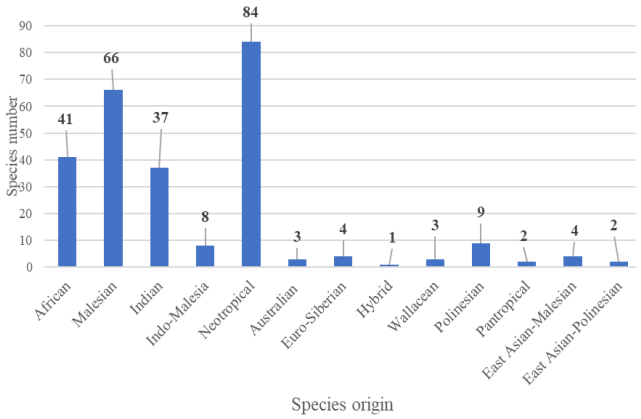

Figure 4. The number of species of ornamental plants in Palu, Palu City, Central Sulawesi, Indonesia, and their origin

Discussion

Qian et al. (2022) reported that the total number of species in the global flora of vascular plants, including natural hybrids, was estimated to reach 376,366 based on calculations. The global flora consists of 369,054 species of vascular plants, excluding natural hybrids. Among these floras, pteridophytes, gymnosperms, and angiosperms account for 13,810, 1,172, and 354,072 species, respectively. The number of vascular plants mentioned in this research was obtained from five different databases, namely World Flora Online (WFO; www.worldfloraonline.org), Plants of the World Online (POWO; www.plantsoftheworldonline.org), World Checklist of Vascular Plants (Govaerts et al. 2021), the Leipzig Catalogue of Vascular Plants (LCVP; Freiberg et al. 2020), and World Plants (WP; https://www.worldplants.de).

The Euphorbiaceae family is commonly cultivated for ornamental purposes in the examined area and is a group of flowering plants belonging to the order Malpighiales. This includes both annual and perennial herbs, as well as woody shrubs, trees, and a few climbers, comprising a total of 6,745 species spread among 218 genera. Several members serve as significant food sources, while other plants have practical value due to the content of sap and oils, often used for many purposes, including the production of pharmaceutical medications. Some plants are visually appealing because of the vibrant bracts they possess (Britannica 2024). This research shows that ornamental plants are cultivated in residential and public spaces, homes, and offices, as well as along roads. The purpose of the cultivation is to enhance the appearance and attractiveness of both indoor and outdoor spaces (Hernández et al. 2014), as well as improve the aesthetic and visual appeal of constructed surroundings (Francini et al. 2022). Ornamental plants are distinguished by its unique structure, foliage, and very vibrant flowers. According to Chowdhuri and Deka (2019), trees are the largest examples of woody perennial plants with a distinct trunk. Trees are a significant category of ornamental plants that play a crucial role in maintaining ecological equilibrium, mitigating air pollution, absorbing air pollutants, minimizing noise pollution, preventing soil erosion, enhancing water conservation, and enhancing the aesthetic appeal of the surroundings.

Several species of ornamental plants are included in the IAPS category, as presented in Table 1. According to Seebens et al. (2017), the global population of IAPS is steadily growing without indications of decline. The rise in global mobility of individuals and products has led to a significant increase in the transportation of organisms across different areas. Consequently, many of these species have established and reproduced in areas outside the original habitat (Shrestha et al. 2022), leading to IAPS being taxonomically diverse. Some local species are extinct or at risk of being defeated by IAPS, and many native ecosystems have been irreversibly lost to invasions (Tjitrosoedirdjo et al. 2016).

IAPS has been introduced in Indonesia since the colonial era from various continents worldwide. Most of these species originated from America, particularly the tropical area, followed by Asia, Africa, Europe, and a

smaller number from Australia and New Zealand (Tjitrosoedirdjo 2005). Certain ornamental plants in Palu were categorized as toxic plants, including *Nerium oleander* (Apocynaceae), *Adenium obesum* (Apocynaceae), *Cerbera odollam* (Apocynaceae), *Dieffenbachia seguine* (Araceae), *Melia azedarach* (Meliaceae), and *Ricinus communis* (Euphorbiaceae).

According to Farkhondeh et al. (2020), all fresh or dead parts of *N. oleander* ornamental shrubs frequently grown as attractive plants in gardens and public city areas had potential toxic effects on animals and the human body. The population of humans affected by *N. oleander* may be due to accidental or intentional consumption, usage for medicinal purposes, or criminal poisoning. In this context, Azzalini et al. (2019) reported a case of a 58-year-old Caucasian woman who died following consumption of *N. oleander* for self-poisoning. Additionally, the pathological evaluation showed petechiae, edema, and congestion in the tongue, gastrointestinal tract, and lungs.

Cerbera odollam is a plant species of the Apocynaceae family and is often dubbed the 'suicide tree' due to its strong cardiotoxic effects, which lead to its use in suicide attempts. The toxicity manifests similarly to acute digoxin poisoning, and ingestion of the kernel causes nausea, vomiting, hyperkalemia, thrombocytopenia, and ECG abnormalities. Exposure to high doses of the fruit carries the highest risk of mortality (Menezes et al. 2018). Some species of the Araceae family have also been reported to have toxic effects, such as *D. seguine,* which is widely used for ornamental purposes in living quarters. However*, D. seguine* is a plant species that can harm human health through contact, chewing, or ingestion (Unlu and Kocabaş 2020).

Ricinus communis, known as Castor bean (Euphorbiaceae), was reported to be a poisonous plant by Abbes et al. (2021). Furthermore, castor bean intoxication is characterized by acute gastroenteritis-like disease as the primary manifestation, leading to severe fluid and electrolyte imbalance. The mechanism of death was peripheral vascular collapse and progressing multiple organ failure occurring 10h-72h after intoxication.

In conclusion, this research found a total of 264 species of ornamental plants belonging to 75 angiosperm and 4 fern families, as well as 1 gymnosperm family. Additionally, the Euphorbiaceae family was identified as the most widely cultivated. There were 8 distinct categories of ornamental plant life forms in the examined area. The most common category was trees, consisting of a total of 89 species. The conservation status of medicinal plants could be classified into 9 categories, including CR, DD, EN, LC, LR, NE, VU, and NT, with 2, 19, 5, 126, 2, 105, 3, and 2 species, respectively. At the same time, several species were categorized as both IAPS and toxic ornamental plants.

ACKNOWLEDGEMENTS

This research was supported by Universitas Tadulako, Palu, Indonesia under the "*Riset Unggulan*" Scheme with contract number 2653/UN28/KU/2024. The authors are grateful to Dr. Lukman Nadjamuddin, the director of the Research and Public Service Institute of Universitas Tadulako, and Prof. Dr. Ir. Adam Malik Adda, MT, IPU, ASEAN Eng, the Director of the Postgraduate Programme, for the great assistance provided. The authors are also grateful to the leaders of the local government of Palu City for granting permission to conduct this research.

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