

Dataset of carnivorous plants survey in Taiwan and Kinmen

臺灣本島與金門的食蟲植物調查資料集

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摘要

食蟲植物多生長於氮、磷等礦質養分貧乏之棲地，因而演化出捕食小型動物以補充土壤中所缺乏之營養元素，其在生理與生態適應機制上具有高度研究價值。為瞭解臺灣的食蟲植物分布現況，於 2014 年至 2024 年進行全面性調查全臺的食蟲植物現況，共紀錄 15 個物種，207 個點位，349 筆資料。包含茅膏菜科 (Droseraceae) 茅膏菜屬 (Drosera) 3 種及狸藻科 (Lentibulariaceae) 狸藻屬 (Utricularia) 12 種。依據 2017 臺灣維管束植物紅皮書名錄，除了 3 個外來歸化植物和一個新紀錄種沒評估外，國家極危級 (NCR, Nationally Critically Endangered) 物種有 2 種，國家瀕危級 (NEN, Nationally Endangered) 有 4 種，國家易危級 (NVU, Nationally Vulnerable) 有 2 種，國家接近受脅級 (NNT, Nationally Near Threatened) 1 種，暫無危機級 (LC, Least Concern) 1 種，不適用區域評估 (NA, Not Applicable) 1 種。本資料集希望對將來食蟲植物研究有所貢獻並促進各界對食蟲植物多樣性保育之合作。

關鍵詞：食蟲植物、紅皮書、受脅物種、熱點調查

Abstract

Carnivorous plants have evolved predatory mechanisms to compensate for nutrient-deficient habitats, particularly to supplement the scarcity of nitrogen, phosphorus, and other soil elements, and their unique physiology and ecology possess significant scientific values. To comprehensively assess the distribution and population status of carnivorous plants in Taiwan, field surveys were conducted from 2014 to 2024. A total of 349 occurrence records were obtained from 207 locations, representing 15 species (including 3 species of Droseraceae and Drosera, and 12 species of Lentibulariaceae and Utricularia) across two families. Based on the 2017 Red List of Vascular Plants in Taiwan, the dataset, excluding three non-native species and one newly recorded species, comprises four species classified as Nationally Endangered (NEN), two as Nationally Critically Endangered (NCR), two as Nationally Vulnerable (NVU), one as Least Concern (LC), one as Nationally Near Threatened (NNT), and one as Not Applicable (NA). This dataset aims to support future research and foster collaborative efforts for the conservation of carnivorous plant diversity in Taiwan.

Keywords: Carnivorous Plants, Red List, Threatened Species, Hotspot Inventory

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Introduction

Carnivorous plants, also known as insectivorous plants, typically inhabit nutrient-poor, acidic wetlands or marshes, where essential nutrients, such as nitrogen and phosphorus, are scarce (Adamec 1997; Ellison and Gotelli 2009). For adaptation, these plants have evolved trapping mechanisms to adapt and capture small insects as a supplementary nutrient source. While they possess chlorophyll and function as primary producers through photosynthesis, their carnivorous behavior also positions them as secondary consumers. This unique combination confers a dual role in the ecosystem (Fan et al. 2025; Huang 2015).

In Taiwan, 15 native and 5 naturalized carnivorous plant species have been documented (Liou et al. 2011; Hsu et al. 2017; Chao and Hsu 2018; Chao et al. 2024). However, the nationwide distribution and status of carnivorous plants have not been well understood due to the lack of comprehensive surveys targeting this group of species. To address this knowledge gap, we conducted a large-scale survey across Taiwan and Kinmen Island from 2014 to 2024.

These results have been compiled into the “Dataset of Carnivorous Plants Survey in Taiwan,” which comprises 349 records, representing 15 species across two families, Droseraceae and Lentibulariaceae (Table 1). The distribution of occurrence records categorized by year and month is presented in Figure 1. According to the Editorial Committee of the Red List of Taiwan Plants (2017), the recorded species include two classified as Nationally Critically Endangered (NCR), four as Nationally Endangered (NEN), two as Nationally Vulnerable (NVU), one as Nationally Near Threatened (NNT) and one as Not Applicable (NA). This dataset addresses knowledge gaps resulted from previously fragmented and spatially

uneven distribution. By prioritizing extensive surveys across potential distribution sites over long-term monitoring data of limited fixed plots, this study compiled occurrence records for multiple species to delineate their overall spatial distribution patterns. The present dataset serves as a foundation for identifying representative or high-priority hotspots for further verification and long-term monitoring.

Project description

Title: Survey Data of Carnivorous plants in Taiwan

Study area description:

Carnivorous plant habitats in Taiwan exhibit considerable ecological diversity and are primarily associated with nutrient-poor and persistently moist environments. Major habitat types include wetlands and wet grasslands, shallow ponds and deeper aquatic habitats, as well as agricultural wetlands, such as rice paddies. In addition, some species occur in open habitats with sandy substrates, including bare sandy ground and sandy grasslands. Certain species are also adapted to specialized microhabitats, such as dripping rock walls, where constant moisture is available. In contrast, the habitat types of carnivorous plants in Kinmen are comparatively less diverse. Most species occur in wetlands, wet grasslands, and water bodies associated with agricultural landscapes, such as rice paddies and agricultural ponds. A few species are also found on exposed rock surfaces or dripping rock walls that provide localized moist microhabitats. Table 2 shows the habitat characteristics of each species, and the distribution of carnivorous plants occurrence records in Taiwan displays in Figure 2.

Taxonomic coverage

General taxonomic coverage description: This dataset focuses on carnivorous plants in Taiwan.

Taxonomic details are described below.

Taxonomic ranks:

Kingdom: Plantae

Phylum: Embryophyta

Class: Spermatopsida

Order: Lamiales, Caryophyllales

Family: Droseraceae, Lentibulariaceae

Spatial coverage

General spatial coverage: The records in this dataset are from main island of Taiwan and nearby Kingmen.

Coordinates: 22°21'52.62"N and 25°11'60"N

Latitude; 118°17'60"E and 121°56'27.75"E

Longitude

Temporal Coverage

January 1, 2014 - December 31, 2024

Methods

Method step description:

1. Data Compilation: Information on the distribution and phenology of carnivorous plants was compiled through a literature review, consultation with taxonomic expert specializing in carnivorous plants.
2. Field Observations: The Society of Wilderness team and citizen scientists conducted field surveys at known carnivorous plant locations identified through the previous data compilation process across Taiwan and Kinmen.
3. Survey Data: During each survey, observed species and GPS coordinates were recorded. Photographs of key morphological features, including flowers, fruits, leaves, and seeds, were taken to support species identification and phenological documentation. Definitions of the phenology categories are provided in Appendix 1.

Study extent description:

From 2014 to 2024, the Society of Wilderness team and citizen scientists observed the distribution of carnivorous plants at 207 locations across mainland Taiwan (189 locations) and Kinmen Island (18 locations). Multiple species were found at the same coordinates, totaling 23 points and 96 records, presenting in Appendix 2. The surveyed locations were selected based on prior data compilation and expert consultations to encompass locations with documented occurrences of carnivorous plant species.

Sampling description:

Field surveys were conducted at 207 locations with previously documented occurrences of carnivorous plants across Taiwan and Kinmen. At each location, observers conducted the targeting searches within the surrounding habitat to detect carnivorous plant species and record their phenological status. Surveys were typically conducted during the flowering seasons to facilitate species identification and phenological observations. Among 207 locations, 89 locations were revisited in multiple years. Lianhua Temple Wetland in Hsinchu was surveyed every year since 2015, resulting in the highest number of repeated surveys. Repeated surveys were necessary because some carnivorous plants have short life cycles (e.g., *Drosera indica*) or may rapidly complete their life cycle under adverse conditions, entering dormancy or producing seeds to survive unfavorable periods. As a result, populations may be seasonally undetectable and show considerable temporal variation, making repeated surveys essential for understanding their life history and phenological patterns.

Quality control description:

During each survey, photographs of key morphological features, including flowers, fruits, leaves, and seeds, were taken to support species identification and phenological documentation. Experts assisted in the professional identification and confirmation of species and phenology. During the data verification and cleaning phase, each survey record underwent a systematic review, including confirming the rationality of coordinate locations, comparing spatial distribution consistency, and identifying and removing duplicate records to prevent data duplication or location errors.

Datasets

Dataset description:

Object name:

Darwin Core Archive Dataset of Carnivorous Plants Survey in Taiwan

Character encoding:

UTF-8

Format name:

Darwin Core Archive format

Format version:

1.9.

Distribution:

https://ipt.taibif.tw/archive.do?r=carnivorousplant_tw

Publication date of data:

2026-01-16

Language:

English

License of use:

[Creative Commons Attribution \(CC-BY 4.0\) License](#)

Metadata language:

English

Dataset metadata: Data structure is presented in Appendix 3.

Metadata creation date:

2026-01-16

Hierarchy level:

Dataset

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professional identification and confirmation of species and phenology in carnivorous plants.

Literature Cited

- Adamec, L. (1997). Mineral nutrition of carnivorous plants: A review. *Botanical Review*, 63: 273-299.
- Chao, Y.S., and T.C. Hsu. (2018). Carnivorous plants in Taiwan: Bladderworts (*Utricularia*). *Taiwan Museum Quarterly*, 37,: 24-31.
- Chao, Y.S., L.C. Wang, C.T. Chen, and C.C. Wang. (2024). New distribution of *Utriculariawarburgii* (Lentibulariaceae) from Taiwan. *Taiwania* 69: 560-568. DOI: 10.6165/tai.2024.69.560
- Editorial Committee of the Red List of Taiwan Plants. (2017). The Red List of Vascular Plants of Taiwan, 2017. Endemic Species Research Institute, Forestry Bureau, Council of Agriculture, Executive Yuan and Taiwan Society of Plant Systematics, Nantou, Taiwan.
- Ellison, A. M. and N. J. Gotelli. (2009). Energetics and the evolution of carnivorous plants—Darwin's 'most wonderful plants in the world'. *Journal of Experimental Botany*, 60: 19-42.
- Fan, R., Takizawa, Y., and P. S. Dharampal. et al. (2025). Carnivorous plants: unveiling trophic identity and advanced nitrogen acquisition strategies. *Progress in Earth and Planetary Science*. 12: 40. <https://doi.org/10.1186/s40645-025-00714-6>
- Hsu, T.C, Z.H. Chen and Y.S. Chao. (2017). New additions of the bladderworts (Lentibulariaceae) in Taiwan. *Taiwania* 62: 99-104. DOI: 10.6165/tai.2017.62.99
- Huang, H.Y. (2015). An ecophysiological study of *Drosera indica*, a rare carnivorous plant in Taiwan. Institute of Ecology and Evolutionary

台灣生物多樣性研究 TW J. Biodivers. 28(3): 205-214, 2026

Biology College of Life Science

National Taiwan University Master Thesis.

Liou,S.C., H.Y.Tzeng,and Y.H. Tseng.(2011).

Utricularia graminifolia Vahl

(Lentibulariaceae): a Newly Naturalized Plant in

Taiwan. Quarterly Journal of Forest Research 33:

29-34.

Shen, J.C.(2020). Interesting and wonderful

carnivorous plants.Wilderness Express 332:12-

15.

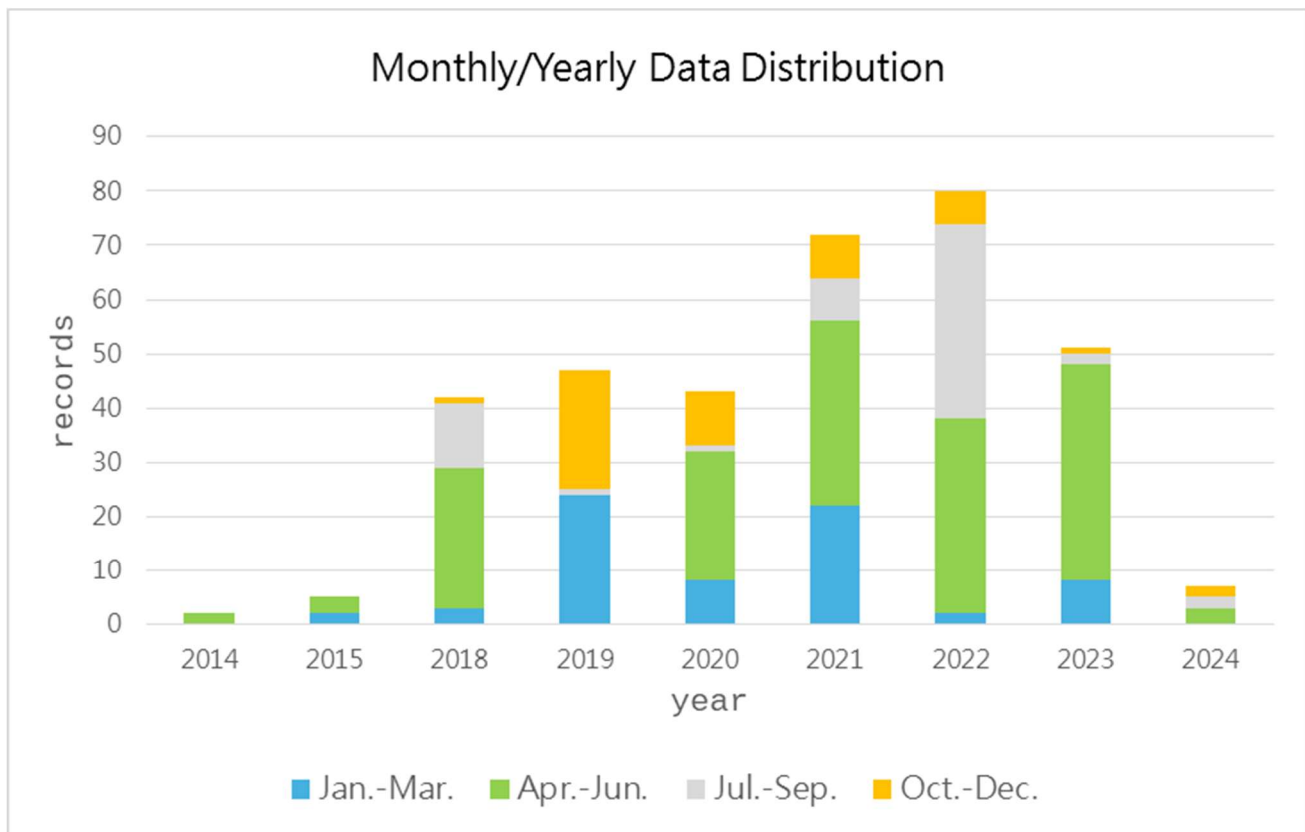


Fig 1. Distribution of Monthly/Yearly recorded Data.

圖 1.各年度及月份之調查資料分布。

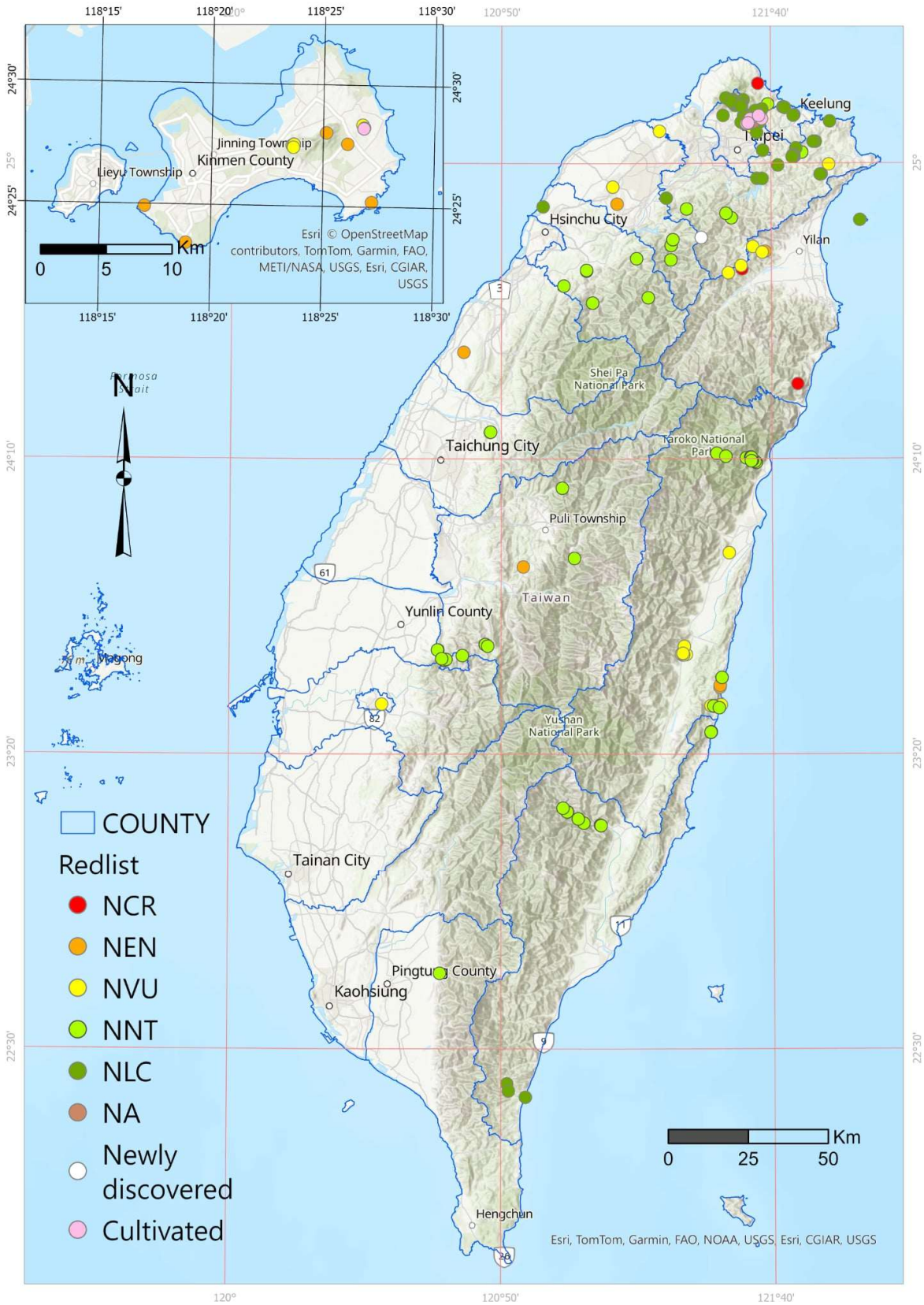


Fig 2. Distribution of carnivorous plants occurrence records in Taiwan and Kinmen.

圖 2. 食蟲植物分布位置圖。

Table 1. List of order, family, species, number of occurrence, and the Red List category in the dataset.

表 1. 資料集內涵蓋的植物目別、科別、種別、觀察數量及紅皮書類別

Order	Family	Species	No. of occurrence	Red List*
Caryophyllales	Droseraceae	<i>Drosera burmannii</i> Vahl	54	NVU
		<i>Drosera indica</i> L.	33	NEN
		<i>Drosera spathulata</i> Lab.	100	LC
Lamiales	Lentibulariaceae	<i>Utricularia aurea</i> Lour.	6	NEN
		<i>Utricularia australis</i> R.Br.	4	NCR
		<i>Utricularia bifida</i> L.	13	NEN
		<i>Utricularia caerulea</i> L.	1	NCR
		<i>Utricularia gibba</i> L.	19	NVU
		<i>Utricularia graminifolia</i> Vahl	1	NA
		<i>Utricularia heterosepala</i> Benj.	22	NEN
		<i>Utricularia striatula</i> Sm.	75	NNT
		<i>Utricularia livida</i> E. Mey.	7	Cultivated
		<i>Utricularia minutissima</i> L.	1	Cultivated
		<i>Utricularia smithiana</i> Wight	12	Cultivated
		<i>Utricularia warburgii</i> K.I. Goebel	1	Newly discovered
		total	15	349

* NCR: Nationally Critically Endangered, NEN: Nationally Endangered, NVU: Nationally Vulnerable, NNT: Near Threatened, LC: Least Concern, NA: Not Applicable

Table 2. Habitat characteristics of each species

表 2.每個物種於調查地區的棲地特徵類別

Species	Habitat characteristics in Taiwan	Habitat characteristics in Kinmen
<i>Drosera burmannii</i> Vahl	Wetland, Grassland	Wetland, Grassland
<i>Drosera indica</i> L.	Wetland, Bare Sandy Substrate, Sandy Grassland	Exposed Rock Surface, Dripping Rock Wall, Grassland
<i>Drosera spathulata</i> Lab.	Dripping Rock Wall, Sandy Grassland	Wetland, Grassland
<i>Utricularia aurea</i> Lour.	Shallow Pond, Rice Paddy Field	-
<i>Utricularia australis</i> R.Br.	Shallow Pond, Deep-water Habitat	-
<i>Utricularia bifida</i> L.	Wetland, Grassland, Dripping Rock Wall, Rice Paddy Field	Wetland, Rice Paddy Field
<i>Utricularia caerulea</i> L.	-	Wetland, Grassland, Dripping Rock Wall
<i>Utricularia gibba</i> L.	Shallow Pond, Rice Paddy Field	Agricultural Pond
<i>Utricularia graminifolia</i> Vahl	Wetland, Grassland	-
<i>Utricularia heterosepala</i> Benj.	Dripping Rock Wall, Sandy Grassland	-
<i>Utricularia striatula</i> Sm.	Dripping Rock Wall	-
<i>Utricularia livida</i> E.Mey.	Wetland, Grassland	-
<i>Utricularia minutissima</i> L.	-	Wetland, Grassland
<i>Utricularia smithiana</i> Wight	Wetland, Grassland	-
<i>Utricularia warburgii</i> K.I. Goebel	Wet Grassland	-