

Data Paper 資料論文

**Dataset of the vascular plants survey of the cemetery
in Miaoli County, Taiwan**

苗栗公墓維管束植物調查資料集

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Abstract

To investigate the distribution of threatened plants in Miaoli cemeteries, we conducted a survey of vascular plants and their phenological data from May 2017 to December 2020, and a total of 3,025 occurrence data were recorded, including, 114 families and 594 species of plants. Among them, there are 9 species classified as Nationally Critically Endangered (NCR), 19 as Nationally Endangered (NEN), 13 as Nationally Vulnerable (NVU), 9 as Nationally Near Threatened (NNT), and 9 with Data Deficient (DD). In addition to rare plants, many alien species have also been discovered, with high occurrence frequency and occupying large areas. Some have already caused harm, such as *Bidens pilosa* var. *radiata*, *Mikania micrantha*, *Ageratum houstonianum*, *Praxelis clematidea*, and *Megathyrsus maximus*.

Key words: Sampling event, Research, Vascular plant, Cemetery, Phenology

摘要

為調查受脅植物於苗栗公墓之分布，自 2017 年 5 月起至 2020 年 12 月，調查苗栗縣內公墓的維管束植物分布位置及物候資料，共記錄 3,025 筆資料，114 科 594 種的植物，其中國家極危（NCR, Nationally Critically Endangered）9 種，國家瀕危（NEN, Nationally Endangered）19 種，國家易危（NVU, Nationally Vulnerable）13 種，國家接近受脅（NNT, Nationally Near Threatened）9 種，資料缺乏（DD, Data Deficient）9 種，除珍稀植物外，亦發現許多外來種植物，出現頻度高且占大面積，有些已造成危害，如大花咸豐草 (*Bidens pilosa* var. *radiata*)、小花蔓澤蘭 (*Mikania micrantha*)、紫花藿香薊 (*Ageratum houstonianum*)、貓腥草 (*Praxelis clematidea*)、大黍 (*Megathyrsus maximus*) 等。

關鍵詞：調查活動、調查、維管束植物、公墓、物候

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Introduction

Miaoli County features a diverse topography, including coastal areas, hills, plateaus, and mountainous regions, with hills being the most prominent feature. The western hills extend from the southern boundary of the Taoyuan and Hsinchu plateaus, with the terrain gradually sloping from east to west. The county's major rivers originate in the eastern mountains and eventually flow westward into the Taiwan Strait. These rivers, arranged from north to south, include Zhonggang Creek, Houlong Creek, Xihu Creek, and Daan Creek. They traverse various terrains, creating a complex landscape and diverse ecosystems that provide suitable habitats for flora and fauna (Zeng *et al.* 1998). This study focuses on the cemeteries in Miaoli

County, which are primarily located in plains and hilly areas, with altitudes ranging from 3 to 643 meters above sea level. The region has a subtropical monsoon climate, with an average annual temperature of 20 to 22°C and an annual rainfall of approximately 1,600 millimeters. These climatic conditions are conducive to the growth and reproduction of plant communities. Due to cultural practices, cemetery areas are generally less disturbed by human activities, making them potential refuges for many native threatened plants. Previous surveys of botanical ecological resources in Miaoli County lacked accurate temporal and spatial distribution information, especially concerning the distribution and conservation of threatened plant species, necessitating

a comprehensive investigation. In order to understand the ecological vegetation status of these areas, a survey of plants in cemeteries was conducted from May 20, 2017, to December 26, 2020. Threatened plants were the main survey targets, and the cross-line survey method was adopted. Since the cemetery was very small, we then walked by following the trail area for all investigations. We took photos and uploaded them to the Taiwan Vascular Plant Survey and Phenology Observation (<https://plant.tbn.org.tw/>). This platform records the time, location, plant list, and phenology, followed by reviewing it every season to collect the growth and phenology status of plants in different seasons. As this was an opportunistic observational survey, common species and plants without flowers or fruits were not documented, resulting in a total of 3,025 records with 594 species from 114 families (Chenet *al.* 2017) (Table 1). Poales is the order with the highest accumulated number

of occurrences (556), followed by the Fabales (537), Asterales (346), Rosales (187), and Malpighiales (184) (Table 1). Among them, the dataset also included 9 Nationally Critically Endangered (NCR) species, 19 Nationally Endangered (NEN) species, 13 Nationally vulnerable (NVU) species, 9 Nationally near threatened (NNT) species, and 9 data deficient (DD) species (Editorial Committee of the Red List of Taiwan Plants 2017). Besides rare plants, many alien species were also identified, with high frequency and extensive coverage, such as *Bidens pilosa* var. *radiata*, *Mikania micrantha*, *Ageratum houstonianum*, *Praxelis clematidea*, and *Megathyrsus maximus* (Miaoli County Natural Ecology Society 2016).

Table 1 List of orders, families and numbers of species and plants in the dataset

表 1 資料集內涵蓋的植物目別、科別、物種數及觀察數量

Order	Family	No. of Species	No. of occurrences
Alismatales	Araceae	2	6
Apiales	Apiaceae	3	13
	Araliaceae	6	11
	Pittosporaceae	1	1
Aquifoliales	Aquifoliaceae	1	4
Arecales	Areaceae	2	10
Asparagales	Amaryllidaceae	2	16
	Asparagaceae	2	13
	Hypoxidaceae	2	9
	Iridaceae	1	5
	Orchidaceae	2	4
Asterales	Asteraceae	57	336
	Campanulaceae	2	10
Austrobaileyales	Schisandraceae	2	6
Boraginales	Boraginaceae	1	14
	Cordiaceae	1	4
	Ehretiaceae	2	18
Brassicales	Brassicaceae	5	14
	Cleomaceae	2	3
Caryophyllales	Aizoaceae	1	2
	Amaranthaceae	10	27
	Basellaceae	2	5
	Cactaceae	2	2
	Caryophyllaceae	5	11
	Droseraceae	1	3
	Molluginaceae	2	2
	Phytolaccaceae	1	1
	Polygonaceae	9	30
	Portulacaceae	2	9
Talinaceae	1	1	

Celastrales	Celastraceae	1	1
Commelinales	Commelinaceae	2	10
Cornales	Cornaceae	1	1
Cucurbitales	Cucurbitaceae	5	29
Dioscoreales	Dioscoreaceae	3	12
Dipsacales	Adoxaceae	2	3
	Caprifoliaceae	1	10
Equisetales	Equisetaceae	1	4
Ericales	Actinidiaceae	1	3
	Ebenaceae	1	1
	Pentaphragaceae	1	1
	Primulaceae	5	26
	Styracaceae	1	2
	Symplocaceae	1	23
Fabales	Fabaceae	69	528
	Polygalaceae	2	9
Gentianales	Apocynaceae	6	24
	Loganiaceae	1	2
	Rubiaceae	16	61
Geraniales	Geraniaceae	1	3
Gleicheniales	Gleicheniaceae	1	2
Lamiales	Acanthaceae	2	8
	Lamiaceae	11	70
	Linderniaceae	2	4
	Oleaceae	1	1
	Orobanchaceae	3	26
	Paulowniaceae	1	1
	Plantaginaceae	2	6
	Scrophulariaceae	2	3
	Verbenaceae	2	21
Laurales	Lauraceae	6	30
Liliales	Liliaceae	1	17
	Smilacaceae	1	19

Malpighiales	Euphorbiaceae	15	84
	Hypericaceae	1	1
	Malpighiaceae	1	1
	Passifloraceae	1	7
	Phyllanthaceae	19	83
	Salicaceae	2	4
Myrtales	Lythraceae	1	25
	Melastomataceae	1	12
	Myrtaceae	2	2
	Onagraceae	4	17
Oxalidales	Elaeocarpaceae	1	1
	Oxalidaceae	2	14
Pandanales	Pandanaceae	1	2
Piperales	Aristolochiaceae	1	4
Poales	Cyperaceae	30	131
	Poaceae	99	423
	Typhaceae	1	2
Polypodiales	Blechnaceae	2	2
	Dennstaedtiaceae	3	11
	Lindsaeaceae	1	2
	Pteridaceae	5	8
	Thelypteridaceae	3	3
Ranunculales	Menispermaceae	3	37
	Papaveraceae	1	1
	Ranunculaceae	3	27
Rosales	Cannabaceae	5	31
	Elaeagnaceae	1	9
	Moraceae	7	46
	Rhamnaceae	2	6
	Rosaceae	17	79
	Ulmaceae	2	7
	Urticaceae	5	9
Santalales	Santalaceae	1	7

Sapindales	Anacardiaceae	5	30
	Meliaceae	1	14
	Rutaceae	3	12
	Sapindaceae	1	11
	Simaroubaceae	1	1
Saxifragales	Altingiaceae	1	4
	Crassulaceae	1	1
Schizaeales	Lygodiaceae	1	14
Solanales	Convolvulaceae	13	54
	Solanaceae	4	11
sparagales	Asphodelaceae	1	5
Vitales	Vitaceae	9	78
Zingiberales	Cannaceae	1	1
	Zingiberaceae	1	16
Zygophyllales	Zygophyllaceae	1	3
total		594	3,025

Project description

Title: Survey Data of Vascular Plant of Cemetery in Miaoli County

Study area description:

A total of 65 cemeteries in Miaoli County were surveyed (Fig. 1).

Taxonomic coverage

General taxonomic coverage description: Vascular plants

Taxonomic ranks:

Phylum: Tracheophyta

Common names: Vascular plants

Spatial coverage

General spatial coverage: Area of Miaoli County, Taiwan.

Coordinates: 24°15'14.4"N and 24°37'55.2"N Latitude; 120°34'26.4"E and 121°19'22.8"E Longitude

Temporal Coverage

May 20, 2017 – December 26, 2020

Methods**Method step description:**

1. Several survey routes were set up along the existing paths in each survey

cemetery. During the survey, mobile phones and the OruxMaps navigation program (<https://oruxmaps.com>) were used to record GPS track data.

2. A camera was used to capture occurrences of vascular plants.

3. After the investigation, the photos were added with GPS coordinates.

4. All records were uploaded to the Taiwan Vascular Plant Survey and Phenological Observation platform (<https://plant.tbn.org.tw/>).

5. Identification of each record's plant species was conducted by experts. After the record was identified, all data were made public to the "Taiwan Biodiversity Network database (<https://www.tbn.org.tw/>)".

Study extent description:

From May 2017 to the end of December 2020, a flora survey was conducted in 65 cemeteries in the county through multiple visits (Table 2).

Sampling description:

Description of the survey method:

Table 2 Profile of survey sites

表 2 調查公墓點說明

Site	Latitude	Longitude	Habitat description
SY_3	24.35379	120.74938	In addition to grasslands, there are some sandbars and secondary forests near streams, and the ground cover is mostly naturalized plants.
DU_1	24.44004	120.87648	Surrounded by broad-leaved mixed forests and bamboo forests, with more grasslands and fewer shrubs.
DU_9	24.37039	120.81833	The area has a smaller slope, mostly shrubs and grasslands, surrounded by broad-leaved mixed forests.
DU_8	24.36804	120.84292	There are many grasses and shrubs in the area surrounded by broad-leaved natural forests.
DU_12	24.36137	120.80359	The area is slightly sloping, with many grass lands and few shrubs in this area.
DU_10	24.34468	120.82877	There are fewer shrubs and more grass lands in this area, with Liyutan Reservoir to the south.
KG_9	24.47078	120.83394	There are many grass lands and fewer shrubs in the area. The south side is an orchard field, and the north side is bamboo forests and broad-leaved forests.
KG_11	24.51168	120.83970	There are fewer shrubs and more grasses in the area.
CN_2	24.68433	120.86073	There are a few small trees in the area, and half are shrubs and grasslands.
HH_1	24.49728	120.75736	It is located at the high point of the northern end of the Houyan Mountains. There are many shrubs and grassland slopes in the area.

XU_2	24.53326	120.75483	The terrain is flat, and half of the area is shrubs and grasslands.
JO_1	24.31888	120.83503	The area is divided equally into shrubs and grasslands.
JO_2	24.30143	120.83785	Most of the area has been abandoned, the ecology tends to develop towards large vines, and the environment has been degraded.
JO_3	24.33199	120.81092	The steep slopes facing south of the cemetery have been sprayed with herbicides on a large scale, and the naturalized species are dominant.
NC_2	24.62755	121.00178	Large herbs and shrubs have been grown in this area.
NC_3	24.63052	120.97917	More shrubs than grasslands have been observed in this area.
HL_n1	24.65776	120.80725	It is located in a small cemetery on an independent hill along the coast. The area is mostly grassland.
HL_21	24.58060	120.74217	There are more grasslands than shrubs in this area.
HL_22	24.60213	120.74653	It is located near the left bank of the Xihu River outlet. There are more grasslands than shrubs in this area.
HL_23	24.60227	120.73446	The terrain is open and flat, and there are more grasslands than shrubs in this area. The northeast wind is strong in this area.
HL_8	24.65914	120.78194	There are many coastal shrubs, vines, and herbaceous plants in this area, and wind-resistant and salt-tolerant shrubs and trees have been planted to prevent wind and sand fixation.
HL_11	24.62850	120.75983	It is a wide and open area located on a plain near the sea. There are more

			grasslands than shrubs in the area.
HL_n2	24.63838	120.76331	It is a wide and open area located on a plain near the sea. There are more grasslands than shrubs in the area.
HL_5	24.64501	120.81040	It is located on a small hill in the coastal plain. There are more shrubs than grasslands in the area.
HL_6	24.65869	120.81959	It is located on the front edge of the hills. There are more shrubs than grasslands in the area.
HL_n3	24.65320	120.80203	It is located on the southern edge of the hills. There are more grasslands than shrubs in the area.
YN_1	24.43134	120.65102	It is located on a hill. The area is divided into grasslands and shrubs.
YN_7	24.42505	120.68828	It is facing south with gradually descending hills. The area is divided into grasslands and shrubs.
YN_2	24.43118	120.65465	It is located on the northwest side of the hill. The area is divided into grasslands and shrubs.
YN_8	24.41524	120.68795	It is on the hills, and the area is divided into grasslands and shrubs.
YN_12	24.44756	120.63587	It is close to the seaside. There is a sand-fixing net with many windproof and sand-fixing plants planted there. There are many seaside plants and lawns in the area.
YN_10	24.39971	120.70151	It is located on the edge of a hill. The hinterland is not large, and half of the area is grasslands and shrubs.
YN_3	24.44424	120.66248	The cemetery area is manually weeded and burned, and the area is divided into grasslands and shrubs.
YN_5	24.44227	120.66550	The area is divided equally between

			grasslands and shrubs.
YN_6	24.43437	120.67209	The west side of the tomb area is close to Yuanli Creek and rice fields, and there are many shrub plants in the area.
MO_1	24.57657	120.80997	It is located on a steep hillside. There is a road running through the center of the cemetery from north to south. The area is divided into grasslands and shrubs.
MO_2	24.53644	120.80354	It is located on a hilly platform. The area has a variety of plant species, with half grasslands and half shrubs.
MO_3	24.52950	120.79093	It is on the hilly platform. There are scattered small tea gardens, ravines, grasslands, and half-grassland and shrub-covered areas in the area.
MO_5	24.58710	120.80130	It is surrounded by dense broad-leaved woods, a few bamboo forests, and mostly covered with shrubs.
SW_1	24.67339	120.95371	It is located on the hilly slopes on the left bank of Zhonggang Creek. The area is mostly covered with shrubs.
TF_n1	24.68670	120.95013	It is sloping down gently to the south on a hilly slope. The area is mostly filled with shrubs.
TA_1	24.34752	120.92778	The area has naturalized plants and a few shrubby plants.
TA_2	24.35952	120.94555	There are more grasslands than shrubs in the area.
TG_9	24.56602	120.71623	It is gently rising up the hillside on the right, with half grasslands and shrubs covering the area.
TG_29	24.50348	120.68594	There are some broad-leaved trees and bamboo forests in the area, and little grassland is covered.
TG_24	24.54503	120.70552	It is on the windward side of the

			hillside near the coast, and most of the area is covered by shrubs.
TG_8	24.49787	120.72051	It is gently descending to the hill slopes to the south, with a variety of plant species, including grasslands and shrubs.
TG_11	24.46179	120.71202	The center of the tomb area is high and slowly descends to the surrounding areas. Half grasslands and half shrubs have been covered in the area.
TG_19	24.52326	120.71997	There are half grassland and half shrubby plants observed in the area.
TG_18	24.50595	120.72325	It is located on a small platform on the hills of the left bank over the Tongxiao and shrubs in the area.
TG_14	24.44754	120.69779	It is a hilly valley with the upper reaches of the Aikouliao River as its slope. The area is divided into half grasslands and half shrubs, with rich plant species.
TG_3	24.48797	120.69981	It is on a hillside, and the center of the cemetery is divided into north and south areas by a road and fields. The area is divided into grasslands and shrubs.
TG_5	24.46710	120.71833	It is on the hilly slope on the right bank of the Nanshi River. The area is divided into half grasslands and half shrubs, with many species.
TG_6	24.46633	120.67075	The hilly platform is crisscrossed by Jingzaipi Creek, and half of the area is covered by grasslands and shrubs.
TG_7	24.50081	120.70958	There are many grass lands in the area, and there are rice fields and fruit tree farming nearby.

TO_7	24.64214	120.83527	The hilly slopes have gullies and small pools. The terrain is complex. There are scattered broad-leaved trees, many shrubs, and grasslands in the area.
TO_5	24.64573	120.86486	It is a small valley. There is a small area of abandoned farmland, shrubs, grassland, and two small pools. There are many shrubs and vines in the area.
ST_4	24.53809	120.92214	It is located on a gently rising hillside on the right bank of the Dadongshi River. There are many naturalized plant grasslands in the area.
TG_9	24.42487	120.80662	It is located on river terraces. The terrain is gentle, with many grasslands and dominant naturalized plants.
TG_1	24.49810	120.78882	It is a gently rising hillside, with few shrubs and many naturalized grasslands.
TG_5	24.48096	120.77312	It is on the gently rising hillside. Herbicides are suspected to have been used in the area, resulting in habitat degradation and rapid growth of naturalized plants.
TG_6	24.46970	120.80394	It is on the left bank of the river terrace. The soil in the area is mostly small gravel grassland, with mostly naturalized plants and simple species.
TF_2	24.66079	120.88676	The gently descending slopes are hilly. There are many dominant naturalized plants in the area, covered by half shrubs and half grassland plants.
TW_11	24.58801	120.89934	It is on the left bank of Mingde Reservoir, and the hilly slopes gently descend to the north. There are many shrubs and grasslands in the area.

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