Trop J Nat Prod Res, October 2023; 7(10):4171-4181 **ISSN 2616-0684 (Print)**
ISSN 2616-0692 (Electronic)

Tropical Journal of Natural Product Research

Available online at https://www.tjnpr.org

Original Research Article

Biological Resource of Family Commelinaceae in Maha Sarakham Province: Diversity, Traditional Uses and Conservation Status

Piyaporn Saensouk[1], Surapon Saensouk[2,*]

[1]*Diversity of Family Zingiberaceae and Vascular Plant for Its Applications Research Unit, Department of Biology, Faculty of Science, Mahasarakham University. Kantharawichai, Maha Sarakham, 44150, Thailand.*
[2]*Diversity of Family Zingiberaceae and Vascular Plant for Its Applications Research Unit, Biodiversity Program, Walairukhavej Botanical Research Institute, Mahasarakham University. Kantarawichai, Maha Sarakham, 44150, Thailand*

ARTICLE INFO

Article history:
Received 24 June 2023
Revised 11 October 2023
Accepted 23 October 2023
Published online 01 November 2023

ABSTRACT

The Family Commelinaceae is considered one of the largest families in the plant kingdom, comprising 41 genera and 731 species. The biodiversity in Maha Sarakham Province plays a significant role in the daily lives of its inhabitants. It's used as local food, vegetables, medicinal and ornamental plants, rituals, natural dyes, traditional cosmetics, and construction materials. This study aimed to determine Commelinaceae's diversity, conservation status and traditional uses in Maha Sarakham Province, northeastern Thailand. Seven genera with 26 species of Commelinaceae were collected between January and December 2021 in field surveys. The genus diversity was *Murdannia (7 species), Cyanoyis and Tradescantea (5 species each), Commelina* (4 species), *Callisia* (3 species), *Amischotolype and Floscopa (1 species each). Callisia repens, Callisia fragrans*, and *Tradescantia spathacea* are popular ornamental species with varied leaf colour. Commelinaceae is significantly distributed in the Kantharawichai District in four ecosystems: deciduous dipterocarp forest (13 species), mixed deciduous forest (4 species), river basin (5 species) and 11 species in home gardens. This study reported 15 native (57.69%) and 11 cultivated species (42.31%) grouped into non-common species (50%) and common species (50%). The phenology is presented from June to September. The conservation status of five species is Least Concern (LC). The study revealed that 16 species from the research area are used for food, ornamental (9 species), rituals (1 species), medicine (4 species), and other purposes (8 species). This study provides important biological resource data on Commelinaceae; to our knowledge, this is the first biodiversity survey of the family.

***Keywords*:** Diversity, Utilisation, Conservation status, Commelinaceae, Maha Sarakham Province

Introduction

Thailand has been rated for its high biodiversity due to its location in the tropics, north of the equator. It has a climate suitable for the growth of various species and ecosystems and promotes natural systems to survive under changing environmental conditions.[1, 2] There is also climate difference and geography, which provide Thailand with the most diverse biological resources in the world.[2] Plant species found in Thailand are approximately 15,000 (5.56% of the world's flora). Thailand has an abundance of forests. [1, 2,] Therefore, plants in Thailand can be used for many important purposes for human life, such as food, vegetables, fruits, construction (such as tables, chairs, and cabinets), medicine and clothing.[1-13]

Maha Sarakham is a province located in the central part of northeastern Thailand. It has a relatively flat area with undulating slopes of about 130 – 230 meters above sea level. It is the province with the least forest area in Northeastern Thailand [14] and is now found to have a continuously decreasing forest area rate. Soon, this little remaining inheritance would probably be gone. Most of the forests in the province were deciduous forest.[14,15]

*Corresponding author. E mail: surapon.s@msu.ac.th
Tel: +660880293958

Citation: Saensouk P and Saensouk S. Biological Resource of Family Commelinaceae in Maha Sarakham Province: Diversity, Traditional Uses and Conservation Status. Trop J Nat Prod Res. 2023; 7(10):4171-4181. http://www.doi.org/10.26538/tjnpr/v7i10.9

Official Journal of Natural Product Research Group, Faculty of Pharmacy, University of Benin, Benin City, Nigeria

Biodiversity contributes to the daily life of Maha Sarakham Province people, such as local food, vegetables, medicine, ornamentals, rituals, dye, traditional cosmetics, construction equipment, etc. Biodiversity is also involved in Thai traditions and wisdom passed down to the present. Therefore, the strength of Maha Sarakham Province is linked to the way of life, culture and local knowledge. It is a living capital connected to every resource, whether forests, animals, or microorganisms, indicating abundance and is an important part of the ecosystem.[14, 15]

Therefore, there should be a study on the diversity of plants, including the analysis of the utilisation of plants in the community forest. This is a critical process to create learning for conservation and to know how to use plants in various fields, as well as to transfer knowledge to youth about plant species, uses and conserving forest resources and maintaining biodiversity.[1, 2, 14, 16]

Family Commelinaceae, or dayflower family or spiderwort family, is one of the largest families in order Commelinales, clade Commelinids in the monocot plants with 41 genera and about 731 species.[16, 17, 18] It is widely distributed in tropical and subtropical regions of the world with the centres of diversity of Commelinaceae being Peninsular India and the foothills of the Himalayas to Thailand and Southwestern China. It is distributed mainly in tropical and warm temperate regions of the world.[19] In Thailand, Thitimetharoch *et al.* (2014) reported 52 species from 13 genera of the family Commelinaceae. [20] The family Commelinaceae is used for animal food, medicine, and ornamental plants.[21] Among a large number of members of Commelinaceae family, popular species include *Murdannia gigantea* (Vahl) G. Brückn, *M. loriformis* (Hassk.) R.S. Rao & Kammathy, *Tradescantia spathacea* Swartz., *T. zebrina* var. *zebrine* and *T. pallida* (Rose) D.R. Hunt, *etc*.[19, 22] Members of family Commelinaceae in Maha Sarakham Province have not been determined previously. This study aims to determine the

diversity, conservation status and traditional uses of the family Commelinaceae in Maha Sarakham Province, Thailand.

Materials and Methods

Plant material and diversity study

The voucher specimens of the family Commelinaceae were collected during field trips around Maha Sarakham Province, northeastern Thailand, between January and December 2021 (Figure 1). All specimens were deposited in the Mahasarakham University Herbarium, Maha Sarakham Province, Thailand. The diversity of the family Commelinaceae, vernacular names, distribution data, ecological data and phenology were recorded from the field around Maha Sarakham Province. The dominant characteristics, such as colour, were also recognised in the field. The correct scientific names of the studied plants were identified using the botanical journals and books of many countries near Thailand, such as Flora of China, Flora Malaysiana, Nordic Journal of Botany, Thai Forest Bulletin (Botany), etc. All species in this study were compared with herbarium specimens that were kept at herbaria aboard, *i.e.*, Herbarium of Department of National Parks, Wildlife and Plant Conservation (BKF), Bangkok Herbarium (BK), Khon Kaen University Herbarium (KKU), Queen Sirikit Botanical Gardens Herbarium (QBG) and available taxonomic literature and online images.

Traditional uses study

The traditional use information for the family Commelinaceae from Maha Sarakham Province, including uses as food, spices, ornamental plants, ritual plants and environmental factors, was reported from interviews with sixteen villagers, especially those with knowledge of medicine. [1, 2, 14, 16]

Conservation status study

Endemic species study: the endemic species of the family Commelinaceae from Maha Sarakham Province were studied based on Kew Science (2022).[18]

Conservation status in the research area: the evaluation criteria for conservation status based on data during the field survey in the research area were recorded as common or rare species.

Conservation status from global data: the evaluation of global criteria for the conservation status of the family Commelinaceae from Maha Sarakham Province was studied from the database of the IUCN. [23, 25]

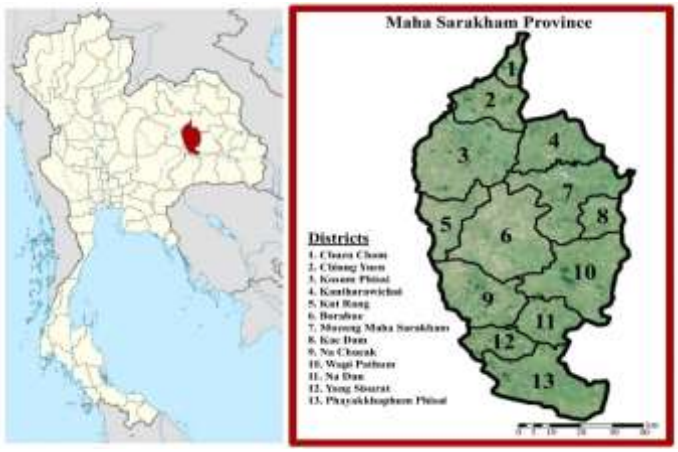

Figure 1: General location and details of Maha Sarakham Province. (Scale bar =10 km).[24]

Results and Discussion

Diversity of family Commelinaceae from Maha Sarakham Province

A total of seven genera with 26 species of Commelinaceae were found in Maha Sarakham Province (Table 1, Figure 2), which differs from the previous study by Thitimetharoch *et al.*, who recorded 52 species from 13 genera of the family Commelinaceae in Thailand.[20] The most diverse genus is *Murdannia*, which comprises 7 species. The second most diverse genera are *Cyanoyis* and *Tradescantea* (5 species each), followed by *Commelina* (4 species) and *Callisia* (three species), respectively. The least diverse were *Amischotolype* and *Floscopa*, with a species each. The distribution, phenology, ecology, endemic species and conservation status are presented in Table 1. All specimens were deposited in the Mahasarakham University Herbarium. Three species, *i.e.*, *Callisia repens* (Jacq.) L., *Callisia fragrans* (Lindl.) Woodson and *Tradescantia spathacea* Swartz., have been found with variations in their leaves (Table 1, Figure 2).

The distinctive features of *Callisia repens* (Jacq.) L. include a single leaf. The colour of the upper and lower leaves differs, with green at the top and purple at the lower surface. The leaves colour on the underside are purple in all parts of the stem. Roots can form when the stems are stretched out to touch the soil. All the varieties of this species are beautiful plants and currently popular ornamental plants (Table 1), which agrees with Chamroenphat and Saensouk, who reported most species of the family Commelinaceae as ornamental plants.[21] Therefore, these variations are thought to be caused by environmental factors such as soil, water, air, etc. There are several varieties found, including:

Callisia repens 'Green' is distinguished by its large, ovate leaves, larger than other varieties. Both sides of the leaves are the same shade of green. (Figure 2A).

The oval, small leaves of *Ca. repens*' Pink Lady' are among its distinguishing features. Figure 2B shows that the elongated leaves have stripes of green, pink, and cream colour, with the underside of the leaf appearing magenta.

Ca. repens 'Bianca' has the following traits, similar to many other varieties: small, oval-shaped leaves that can be pure green, speckled, or pink; the colour of the leaves can also change depending on the surroundings (Figure 2C).

The following traits of *Callisia repens* 'Gold' stand out: small, oval-shaped leaves. The leaves have a beautiful golden-green colour compared to the magenta bottom (Figure 2D).

'Turtle Vine' *Callisia repens* is distinguished by the following traits: small, ovate leaves are present. The upper leaves have a green tint to them. The leaves at the bottom have a purple colour (Figure 2E).

Callisia fragrans (Lindl.) Woodson, sometimes called Basket Plant, is a beautiful subtropical creeper plant. It has the appearance of a draping stem shape, similar to a bromeliad. It appears to be beautiful. It has been found that both of these varieties of *Callisia fragrans* (Lindl.) Woodson results from environmental elements such as water, soil, air, etc.

The first variety, called "Green Leaves" *Ca. fragrans* have just green leaves (Figure 2G).

All of the leaves on the second variety, *Ca. fragrans*, also known as "Variegated Leaves," "Melnikoff," or "Variegated Golden Tendril," are variegated. The leaves of this cultivar have a lighter green border and may get stripes (Fig. 2H).

In Maha Sarakham Province, both of these *Callisia fragrans* (Lindl.) Woodson cultivars are popular as ornamental plants for housing gardens. According to Saensouk & Saensouk in 2022[16], it has two leaf variations: green and variegated leaves, often known as "Variegated Golden Tendrils".

Commonly planted as a ground cover crop, Tradescantia spathacea Swartz has a single lanceolate leaf with a green upper surface and a reddish purple bottom leaf surface. The base of the leaf forms a sheath surrounding the trunk with little white blossoms. Two sheaths, shaped like a purple-green shell or a boat, support the inflorescence. This plant can withstand dryness and is used as a decorative plant. Due to environmental conditions, such as water, soil, and air, it has also been determined to be a popular decorative plant for a long time. This is consistent with studies conducted by Nandikar & Gurav and Saensouk & Saensouk.[16, 22] Based on its leaf features, Table 1 and Figure 2 show four attractive plant variants. *i.e.*:

Tradescantia spathacea Swartz. 'Red Large Leaves' has all red large leaves (Figure 2S).

T. spathacea 'Red Small Leaves' has all red small leaves (Figure 2T).

T. spathacea 'Green Leaves' has all green leaves (Figure 2U).

T. spathacea 'Dwarf Tricolour' has all tricolour leaves (Figure 2V).

Table 1: Diversity notes of Commelinaceae in Maha Sarakham Province

Genera	Species	Voucher specimens	Distribution	Phenology	Ecology	Conservation status		
						Endemic species[18]	Based on the study area	Based on IUCN[20]
1. Amischotolype (1 species)	*Amischotolype mollissima* (Blume) Hassk.	Saensouk 5000	Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species	
2. Callisia (3 species)	*Callisia repens* (Jacq.) L. 'Green'	Saensouk 5001	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	Ca. repens (Jacq.) L. 'Rosato - Pink Lady'	Saensouk 5002	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	Ca. repens (Jacq.) L. 'Bicolor Leaves'	Saensouk 5003	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	Ca. repens (Jacq.) L. 'Gold'	Saensouk 5004	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	Callisia repens (Jacq.) L. 'Turtle Vine'	Saensouk 5005	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	Ca. soconuscensis Matuda	Saensouk 5006	Kantarawichai and Muang Maha Sarakham Districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species	
	Ca. fragrans (Lindl.) Woodson 'Green'	Saensouk 5007	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	Ca. fragrans (Lindl.) Woodson 'Variegated Golden Tendril'	Saensouk 5008	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
3. Commelina (4 species)	*Commelina bengalensis* L.	Saensouk 5009	All districts	Fl. & Fr. June-Sept.	DDF, RB	Not endemic	Common species	
	Co. clavata C.B.Clarke	Saensouk 5010	Kantarawichai District	Fl. & Fr. June-Sept.	DDF	Not endemic	Rare species	LC
	Co. diffusa Burm. f.	Saensouk 5011	All districts	Fl. & Fr. June-Sept.	DDF, RB	Not endemic	Common species	
	Co. erecta L.	Saensouk 5012	Kantarawichai District	Fl. & Fr. June-Sept.	DDF	Not endemic	Rare species	LC
4. Cyanotis (5 species)	*Cyanotis axilaris* (L.) D.Don ex Sweet	Saensouk 5013	All districts	Fl. & Fr. June-Sept.	DDF	Not endemic	Common species	
	Cy. crsitata (L.) D.Don	Saensouk 5014	Chiang Yuen, Kae Dam, Kosum Phisai, Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	DDF, RB	Not endemic	Rare species	
	Cy. vaga (Lour.) Schult. & Schult. f.	Saensouk 5015	Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	DDF, RB	Not endemic	Rare species	

	Cy. villosa (Spreng.) Schult. f.	Saensouk 5016	Chiang Yuen, Kae Dam, Kosum Phisai, Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	DDF, RB	Not endemic	Rare species	
	Cy. fasciculata (B.Heyne ex Roth) Schult. & Schult.f.	Saensouk 5017	Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species	LC
5. Floscopa (1 species)	*Floscopa scandens* Lour.	Saensouk 5019	Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	MDF	Not endemic	Rare species	LC
6. Murdannia (7 species)	*Murdannia edulis* (Stokes) Faden.	Saensouk 5020	All districts	Fl. & Fr. June-Sept.	DDF	Not endemic	Common species	
	M. japonica (Thunb.) Faden	Saensouk 5021	Chiang Yuen, Kae Dam, Kosum Phisai, Na Chueak and Kantarawichai Districts	Fl. & Fr. June-Sept.	MDF	Not endemic	Rare species	
	M. loriformis (Hassk.) R.S.Rao & Kammathy	Saensouk 5024	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	M. medica (Lour.) D.Y.Hong	Saensouk 5025	All districts	Fl. & Fr. June-Sept.	DDF, MDF	Not endemic	Common species	
	*M. nudiflora (*L.) Brenan	Saensouk 5022	All districts	Fl. & Fr. June-Sept.	DDF	Not endemic	Common species	
	M. spectabilis (Kurz) Faden.	Saensouk 5023	All districts	Fl. & Fr. June-Sept.	DDF	Not endemic	Common species	
	M. spirata (L.) G.Brückn.	Saensouk 5026	Na Chueak District	Fl. & Fr. June-Sept.	DDF, MDF	Not endemic	Rare species	LC
7. Tradescantia (5 species)	*Tradescantia fluminensis* Vell.	Saensouk 5027	Kantarawichai District	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species	
	T. spathacea Swartz. 'Red Large Leaves.'	Saensouk 5028	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	T. spathacea Swartz. 'Red Small Leaves.'	Saensouk 5029	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	T. spathacea Swartz. 'Green Leaves.'	Saensouk 5030	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species	
	T. spathacea Swartz. 'Dwarf Tricolour'	Saensouk 5031	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species	
	T. pallida (Rose) D.R.Hunt.	Saensouk 5032	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	
	T. zebrina hort. ex Bosse	Saensouk 5033	All districts	Fl. & Fr. June-Sept.	Cult.	Not endemic	Common species	

	T. mundula Kunth Variegata 'Tricolor'		Saensouk 5034	Kantarawichai District	Fl. & Fr. June-Sept.	Cult.	Not endemic	Rare species

Note: DDF: deciduous forest, MDF: mixed deciduous forest, RB: river basin, Cult.: cultivated, Fl: flowering period, Fr: fruiting period, LC = Least Concern

Figure 2: Some native and cultivated species of the family Commelinaceae in Maha Sarakham Province, Thailand. A. *Callisia repens* (Jacq.) L. 'Green', B. *Ca. repens* (Jacq.) L. 'Rosato - Pink Lady', C. *Ca. repens* (Jacq.) L. 'Bicolor Leaves', D. *Ca. repens* (Jacq.) L. 'Gold', E. *Ca. repens* (Jacq.) L. 'Turtle Vine', F. *Ca. soconuscensis* Matuda, G. *Ca. fragrans* (Lindl.) Woodson 'Green', H. *Ca. fragrans* (Lindl.) Woodson 'Variegated Golden Tendril', I. *Commelina bengalensis* L., J. *Co. clavata* C.B. Clarke, K. *Co. diffusa* Burm. f., L. *Cyanotis axilaris* (L.) D. Don ex Sweet, M. *Cy. crsitata* (L.) D.Don, N. *Murdannia edulis (*Stokes*)* Faden., O. *M. loriformis* (Hassk.) R.S. Rao & Kammathy, P. *M. medica* (Lour.) D.Y.Hong, Q. *M. nudiflora (*L.*)* Brenan, R. *Tradescantia fluminensis* Vell., S. *T. spathacea* Swartz. 'Red Large Leaves', T. *T. spathacea* Swartz. 'Red Small Leaves', U. *T. spathacea* Swartz. 'Green Leaves', V. *T. spathacea* Swartz. 'Dwarf Tricolour', W. *T. pallida* (Rose) D.R.Hunt., X.-Y. *T. zebrina* hort. ex Bosse

Distribution
The Commelinaceae family has the most diverse species, with 25 species found in Kantharawichai District, 21 species in Na Chueak District, 15 species in each of the districts of Chiang Yuea, Kae Dam, and Kosum Phisai, and 13 species in each of the other districts Chuen Chom, Kut Rang, Borabue, Wapi Pathum, Na Dun, Yang Sisurat, and Phayakkhaphum Phisai. These results were discovered while collecting specimens in the family Commelinaceae in Maha Sarakham Province. Many water sources, swamps, and forested areas may be found in the Kantharawichai District and Na Chueak District, which has resulted in a significant number of plants being investigated. This is consistent with reports from Numpulsuksant *et al*. (2021) and Saisor *et al.* (2021).[14, 15]

Ecology
Table 1 presents the ecology of every species included in this study. Four ecosystems contained family members: From deciduous forest, 13 species were collected, including 5 species of *Murdania*, 4 species of *Cammelina*, and 4 species of *Cyanotis*. Mixed deciduous forest had four species: three species of *Murdania* and one species of *Floscopa*. The following five species were found in a river: *Commelina bengalensis* L., *Co. diffusa* Burm. f., *Cyanotis crsitata* (L.) D. Don, *Cy. vaga* (Lour.) Schult. & Schult.f., and *Cy. villosa* (Spreng.) Schult. f. Eleven species (which included other species) were grown in Maha Sarakham Province's backyard gardens. Consequently, the Maha Sarakham Province indicated that 15 species (57.69%) were native flora. A total of 11 species (42.31%) were identified as being grown in home gardens within the research region. Due to the attractive morphological characteristics of all species in both genera—particularly the leaves, which are consistent with the reports of multiple scientists—all species of the genera *Callisia* and *Tradescantia* were grown as decorative plants in home gardens.[14, 15, 17, 18, 20, 22]

Phenology
Table 1 shows that all plants in the family Commelinaceae in the Maha Sarakham Province showed flowering and fruiting from June to September, consistent with other scientists' earlier reports.[17, 20]

Conservation status
Endemic species: Based on Kew Science (2022),[18] Table 1 indicates that every plant in the family Commelinaceae in Maha Sarakham Province was reported as not being an endemic species.

Evaluation criteria for the research area's Commelinaceae conservation status: During the specimen survey, the conservation status of the species was noted. Thirteen species (50%) were determined to be common species, while thirteen species (50%) were identified as rare species (Table 1).
Evaluation criteria for the conservation status of Commelinaceae by database of IUCN in 2022.[23] From Table 1, it can be seen that five species of the family Commelinaceae from Maha Sarakham Province were Least Concern or LC from IUCN[23], namely *Commelina clavata* C.B. Clarke, *Co. erecta* L., *Cyanotis fasciculata* (B.Heyne ex Roth) Schult. & Schult.f., *Floscopa scandens* Lour. and *Murdannia spirata* (L.) G.Brückn. (Table 1).

Traditional uses of Commelinaceae in Maha Sarakham Province
Seven genera and 26 species, part of the Commelinaceae family, were recognised and recorded in Maha Sarakham Province. These plants have been traditionally utilised for various purposes, such as a food source, as ornamental plants, in rituals of religion, as medicinal resources, and as environmental elements (Table 2).
According to the data presented in Table 2, it can be observed that 16 species, accounting for 61.54% of the total, were identified as being utilised as food for cattle and buffalo. These species include *Amischotolype mollissima* (Blume) Hassk. and all species within the *Commelina* genus, such as *Cyanotis* and *Murdania*, except for *M. loriformis* (Hassk.) R.S. Rao & Kammathy. This result aligns with the findings reported by Chamroenphat and Saensouk in 2021.[21]
Nine species, accounting for 34.62% of the observed species, encompassing all species and varieties within the *Callisia* genus and *Floscopa scandens* Lour. and *Murdania loriformis* (Hassk.), were identified. According to Nandikar and Gurav (2019) and Saensouk and Saensouk (2020), various species and varieties of *Tradescantia*, such as R.S. Rao & Kammathy, exhibit aesthetically pleasing foliage, making them suitable for cultivation as ornamental plants. These plants can be effectively utilised in hanging pots or as ground cover, either independently or in combination with other trees (Table 2).[14, 22] *Callisia repens* (Jacq.) L. and *Callisia fragrans* (Lindl.) Woodson have been utilised for medicinal purposes.[18]
Both varieties of *Callesia fragrans* (Lindl.) Woodson (3.85%) was utilised in ceremonial practices as a propitious botanical specimen to bestow prosperity (Table 2), marking the initial documentation of such usage.

Table 2: Traditional uses of the family Commelinaceae in Maha Sarakham Province

Genus	Species	Traditional use				
		Food	**Ornamental**	**Ritual**	**Medicine**	**Environment factor**
1. Amischotolype (1 species)	*Amischotolype mollissima* (Blume) Hassk.	Weeds are a food source for cattle animals such as cattle and buffalo.				
2. Callisia (3 species)	*Callisia repens* (Jacq.) L. *'Large green'*		This particular plant possesses attractive foliage, making it suitable for cultivation as an ornamental plant in suspended containers and for ground coverage.			This plant can help cleanse the air and produce oxygen at night in a room.
	Ca. repens (Jacq.) L. 'Rosato - Pink Lady'		It can be planted as ground cover or as an ornamental plant in hanging pots because of its attractive leaves.			This plant can help cleanse the air and produce oxygen at night in a room.

	Ca. repens (Jacq.) L. 'Bicolor Leaves'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its beautiful leaves.		This plant can help cleanse the air and produce oxygen at night in a room.
	Ca. repens (Jacq.) L. 'Gold'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its attractive leaves.		The plant can help cleanse the air and produce oxygen at night in a room.
	Callisia repens (Jacq.) L. 'Turtle Vine'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its beautiful leaves.		This plant can help cleanse the air and produce oxygen at night in a room.
	Ca. soconuscensis Matu da	It can be planted as ground cover or as an ornamental plant in hanging pots because of its beautiful leaves.		This plant can help cleanse the air and produce oxygen at night in a room.
	Ca. fragrans (Lindl.) Woodson 'Green'	It can be planted asIt is possible ground cover or as anto have ornamental plant inprosperity hanging pots becausewith this lucky of its beautiful leaves. plant.		This plant can help cleanse the air and produce oxygen at night in a room.
	Ca. fragrans (Lindl.) Woodson 'Variegated Golden Tendril'	It can be planted asThis plant is ground cover or as anpromising and ornamental plant incan bring hanging pots becausewealth. of its lovely leaves.		This plant can help cleanse the air and produce oxygen at night in a room.
3. Commelina (4 species)	*Commelina bengalensis* L.	Cattle and buffalo eat weeds.		
	Co. clavata C.B.Clarke	Cattle and buffalo eat weeds.		
	Co. diffusa Burm. f.	Cattle and buffalo eat weeds.		
	Co. erecta L.	Cattle and buffalo eat weeds.		
4. Cyanotis (5 species)	*Cyanotis axilaris* (L.) D.Don ex Sweet	Cattle and buffalo eat weeds.		
	Cy. crsitata (L.) D.Don	Cattle and buffalo eat weeds.		
	***Cy. vaga* (Lour.) Schult. & Schult.f.**	Cattle and buffalo eat weeds.		
	Cy. villosa (Spreng.) Schult. f.	Cattle and buffalo eat weeds.		

	Cy. fasciculata (B.Heyne ex Roth) Schult. & Schult.f.	Cattle and buffalo eat weeds.		
5. Floscopa (1 species)	*Floscopa scandens* Lour.		Beautiful whole plant used as a decorative accent.	
6. Murdannia (7 species)	*Murdannia edulis (*Stokes) Faden.	Cattle and buffalo eat weeds.		
	M. japonica (Thunb.) Faden	Cattle and buffalo eat weeds.		
	M. loriformis (Hassk.) R.S.Rao & Kammathy		It is grown as an ornamental plant.	The juice of this plant has been demonstrated to lessen adverse symptoms, including nausea, vomiting, appetite loss, mouth sores, dry mouth, exhaustion, joint and muscular pain, diarrhoea, constipation, hair loss, and other adverse effects, in patients undergoing radiation and chemotherapy. This plant can also strengthen the body's immune system and stop cancer from spreading and coming back after treatment.
	M. medica (Lour.) D.Y.Hong	Cattle and buffalo eat weeds.		
	M. nudiflora (L.) Brenan	Cattle and buffalo eat weeds.		
	M. spectabilis (Kurz) Faden.	Cattle and buffalo eat weeds.		
	M. spirata (L.) G.Brückn.	Cattle and buffalo eat weeds.		
7. Tradescantia (5 species)	*Tradescantia fluminensis* Vell.		It can be planted as ground cover or as an ornamental plant in	The whole plant isThis particular botanical consumed as a thermalspecimen can be situated within treatment and has thean enclosed space, such as a

	hanging pots because of its lovely leaves.	potential to lessen urinary tract discomfort.	room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. spathacea Swartz. 'Red Large Leaves.'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its lovely leaves.	Leaves infusion of this plant is drunk to alleviate fever and sore throat symptoms.	This particular botanical specimen can be situated within an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. spathacea Swartz. 'Red Small Leaves.'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its lovely leaves.	Leaves infusion of this plant is drunk to alleviate fever and sore throat symptoms.	This particular botanical specimen can be situated within an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. spathacea Swartz. 'Green Leaves.'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its lovely leaves.	The whole plant is utilised in ritual practices.	Leaves infusion of this plant is drunk to alleviate fever and sore throat symptoms.	This particular botanical specimen can be situated within an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. spathacea Swartz. 'Dwarf Tricolour'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its lovely leaves.	Leaves infusion of this plant is drunk to alleviate fever and sore throat symptoms	This particular botanical specimen can be situated within an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. pallida (Rose) D.R.Hunt.	It can be planted as ground cover or as an ornamental plant in hanging pots because of its lovely leaves.	The therapeutic properties of this plant involve alleviating an symptoms of dehydration and inflammation. The recommended preparation method involves boiling the entire plant in water and then consuming the resulting infusion to facilitate healing.	This particular botanical specimen can be situated within an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. zebrina hort. ex Bosse	It can be planted as ground cover or as an		This particular botanical specimen can be situated within

	ornamental plant in hanging pots because of its lovely leaves.	an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.
T. mundula Kunth Variegata 'Tricolor'	It can be planted as ground cover or as an ornamental plant in hanging pots because of its lovely leaves.	This particular botanical specimen can be situated within an enclosed space, such as a room, and subsequently contribute to air purification and the nocturnal generation of oxygen.

Four species, namely *Murdania loriformis* (Hassk.) R.S. Rao & Kammathy, *Tradescantia fluminensis* Vell., *T. spathacea* Swartz (all varieties), and *T. pallida* (Rose) D.R. Hunt have been employed for medicinal purposes. This finding corresponds to the research conducted by Chamroenphat and Saensouk in 2021, as well as the information provided by Kew Science in 2022.[18, 21]

The efficacy of *Murdania loriformis* (Hassk.) R.S. Rao & Kammathy, a botanical extract, has been demonstrated to reduce adverse effects experienced by patients undergoing radiation and chemotherapy treatment. These effects include but are not limited to nausea, vomiting, anorexia, stomatitis, xerostomia, fatigue, arthralgia, myalgia, diarrhoea, constipation, alopecia, and other side effects. Furthermore, it can mitigate the dissemination and reappearance of cancer after medical intervention while concurrently augmenting the body's immunological response.

Tradescantia fluminensis Vell., often known as all of the plants of *Tradescantia fluminensis* Vell., has been historically consumed as a traditional treatment for alleviating heat-related ailments. Furthermore, it has been observed to possess anti-inflammatory properties that may aid in reducing inflammation inside the urinary system.

It is recommended to prepare a decoction by boiling the leaves of *T. spathacea* Swartz. Varieties of big red leaves', 'Small Red Leaves', and 'Green Leaves' in water to alleviate symptoms of fever and sore throat, The plant known as *T. pallida* (Rose) D.R.Hunt possesses medicinal properties that have been seen to alleviate symptoms of dehydration and bruises. Traditional practice involves boiling the entire plant in water and consuming the resulting infusion to facilitate healing.

This study comprehensively analysed a sample comprising eight species, accounting for approximately 30.77% of the overall sample. These species were explicitly defined as encompassing all varieties of *Callesia* and *Tradescantia*. The findings of this study indicate that these species can serve as appropriate environmental factors for indoor placement. These plants significantly contribute to the process of air purification and the generation of oxygen throughout the night, which is consistent with previous research findings documented in the academic literature.[18]

Conclusion

The study revealed the importance of the Commelinaceae family to the people of Maha Sarakham Province in Northeastern Thailand. Species of this family have been used for various purposes, including food, medicine, rituals, decorations, environment and construction of pieces of furniture for centuries. Twenty-six species belonging to seven genera of the Commelinaceae family were identified in this study. This study is the first report on this significant family. It provides data, including the biodiversity, conservation status and traditional uses of the family Commelinaceae in Maha Sarakham Province, northeastern Thailand, which can serve as a repository biological resource for future study.

Conflict of Interest

The authors declare no conflict of interest.

Authors' Declaration

The authors hereby declare that the work presented in this article is original and that any liability for claims relating to the content of this article will be borne by them.

Acknowledgments

This study was financially supported by Mahasarakham University. We want to thank the Walai Rukhavej Botanical Research Institute and Mahasarakham University for their facilities during the study. In addition, warm thanks to the curators and staff of the BKF and BK herbaria visited. Many thanks to our students for their help in the field. We also thank Dr. Jolyon Dodgson, an agriculturist, crop scientist and plant pathologist from the UK, for language editing and suggestions to improve the manuscript.

References

1. Inta A, Trisonthi P, Trisonthi C. Analysis of traditional knowledge in medicinal plants used by Yuan in Thailand. J Ethnopharmacol. 2013; 149: 344-354. DOI: 10.1016/j.jep.2013.06.047.
2. Khuankaew S, Srithi K, Tiansawat P, Jampeetong A, Inta A, Wangpakapattanawong P. Ethnobotanical study of medicinal plants used by Tai Yai in Northern Thailand. J Ethnopharmacol. 2014; 151 (2): 829-838. DOI: 10.1016/j.jep.2013.11.033.
3. Cruz-Garcia GS, Struik PC, Johnson DE. Wild harvest: distribution and diversity of wild food plants in rice ecosystems of Northeast Thailand. NJAS - Wageningen J Life Sci. 2016; 78: 1-11. DOI: 10.1016/j.njas.2015.12.0030.
4. Panyadee P, Balslev H, Wangpakapattanawong P. Woody plant diversity in urban home gardens in Northern Thailand. Econ Bot. 2016; 70 (3): 285-302. DOI: 10.1007/s12231-016-9348-9
5. Saensouk S, Saensouk P, Pasorn P, Chantaranothai P. Diversity, Traditional Uses and New Record of Zingiberaceae in Nam Nao National Park, Petchabun Province, Thailand. Agr. Nat. Resour. 2016; 50: 445-453.https://doi.org/10.1016/j.anres.2016.08.002
6. Pholhiamhan R, Saensouk S, Saensouk P. Ethnobotany of Phu Thai ethnic group in Nakhon Phanom Province, Thailand. Walailak J Sci Technol. 2018; 15 (10): 679-699. DOI: 10.48048/wjst.2018.3737

7. Phumthum M, Balslev H. Using ICPC-2 standard to identify Thai Zingiberaceae of pharmacological interest. Plants. 2020; 9(7): 906. DOI:10.3390/plants9070906.
8. Junsongduang A, Sirithip K, Inta A, Nachai R, Onputtha B, Tanming W, Balslev H. Diversity and Traditional Knowledge of Textile Dyeing Plants in Northeastern Thailand. Econ Bot. 2017; 71(3): 241-255. DOI 10.1007/s12231-017-9390-2
9. Junsongduang A, Kasemwan W, Lumjoomjung S, Sabprachai W, Tanming W, Balslev H. Ethnomedicinal knowledge of traditional healers in Roi Et, Thailand. Plants. 2020; 9 (9): 1177. DOI: 10.3390/plants9091177
10. Punchay K, Inta A, Tiansawat P, Balslev H, Wangpakapattanawong P. Traditional knowledge of wild food plants of Thai Karen and Lawa (Thailand). Genet Resour Crop Evol. 2020; 67 (5): 1277-1299. DOI: 1007/s10722-020-00910-x.
11. Saensouk P, Saensouk S. Karyological Study of Four Species in *Callisia* and *Cyanotis* (Commelinaceae) from Thailand. Cytologia. 2021; 86(4): 339-343.
12. Phatlamphu N, Saensouk S, Saensouk P, Jungsongduang A. Ethnobotany of edible plants in Muang District, Kalasin Province, Thailand. Biodiversitas. 2021, 22 (12): 5432-5444. DOI: 10.13057/biodiv/d221225.
13. Ragsasilp A, Saensouk P, Saensouk S. Ginger family from Bueng Kan Province, Thailand: Diversity, conservation status, and traditional uses. Biodiversitas. 2022; 23: 2739-2752. https://doi.org/10.13057/biodiv/d230556
14. Saisor N, Prathepha P, Saensouk S. Ethnobotanical study and utilisation of plants in Khok Nhong Phok forest, Kosum Phisai District, Northeastern Thailand. Biodiversitas. 2021; 22 (10): 4336-4348. DOI: 10.13057/biodiv/d221026.
15. Numpulsuksant W, Saensouk S, Saensouk, P. Diversity and ethnobotanical study of medicinal plants in Ban Hua Kua, Kae Dam District, Thailand. Biodiversitas. 2021; 22 (10): 4349-4357. DOI: 10.13057/biodiv/d221027.
16. Saensouk P, Saensouk S. Karyological Study of Four Genera and Seven Species (Commelinaceae) in Thailand. Cytologia. 2022; 87(1): 41-47.
17. Christenhusz MJM, Byng JW. The number of known plants species in the world and its annual increase. Phytotaxa. 2016; 261: 201–217.
18. Kew Science. World Checklist of Selected Plant Families (WCSP). 2022; http://apps.kew.org/wcsp/
19. Nandikar MD, Gurav RV. Additions to the family Commelinaceae in flora of India. J. Asia-Pac. Biodiv. 2019; 12: 333–340.
20. Thitimetharoch T, Chantaranothai P, Faden RB. On Progress of Thai Commelinaceae. In: Clark, R., Wearn, J. And Simpson, D. A. (eds.). Thai For Bull (Bot.). 2014; Office of National Buddishm Press. Bangkok.
21. Chumroenphat T, Saensouk S. Amino acid, bioactive compounds and biological activities of ten species from family Commelinaceae in Thailand. Not Bot Horti Agrobo. 2021; 49(3): 12391. https://doi.org/10.15835/nbha49311924
22. Saensouk S, Saensouk P. A Karyological Study of Six Commelinaceae Species from Thailand. Cytologia. 2020; 85(1): 57-62.
23. IUCN. The IUCN Red List of Threatened Species. Version 2022-1. 2022; https://www.iucnredlist.org
24. Maha Sarakham Province. 2021; https://www.google.com/maps/place/ Maha Sarakham
25. El Brahimi R, El Barnossi A, Amrani M, Bari A. Ethnobotanical Study and Biodiversity of Medicinal Plants Used in the Province of Taza Northeastern Morocco. Trop J Nat Prod Res. 2022; 6(11): 1814-1831. http://www.doi.org/10.26538/tjnpr/v6i11.12