

Diversity and Benefits of Asteraceae in Kapopo Ngatabaru Great Forest Park

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Abstract. This study aims to determine the Asteraceae family's diversity, origin, and benefit in Kapopo Ngatabaru Great Forest Park, Central Sulawesi. The study was conducted in June 2023. The study used the exploration method. The results of this study found there are five species of Asteraceae in Kapopo Ngatabaru Great Forest Park: *Chromolaena odorata*, *Porophyllum ruderale*, *Eleutheranthera ruderalis*, *Synedrella nodiflora*, and *Tridax procumbens*. These five species are introduced species that have benefits as herbal medicine and pesticides.

1 Introduction

Family Asteraceae is one of the most prominent families of Angiosperms [1]. Family Asteraceae has 32,000 species, 1,900 genera, and 13 subfamilies [2]. According to [3], the Asteraceae is adaptable and can grow in almost all habitat types worldwide. Because of that, members from the Family Asteraceae own cosmopolitan, invasive, and endemic species [4]. Family Asteraceae make such an economy meaningful; many are food sources for humans, plants, horticulture, and herbal medicines [5].

Family Asteraceae is characterised by inflorescence type pseudanthium that gathers small flowers (florets) that are close together (composite) and surrounded by involucre (phyllaries) so as if seen like a flower single. The term head, capitulum, or capitula is also known as a pseudanthium flower compound. Floret on Asteraceae consists of two types, namely disk flower and ray flower. On a seed from Family Asteraceae, there is a named structure pappus, a modification from the calyx that works to spread seeds [6].

According to [7], the number of Family Asteraceae in Indonesia is around 155 species: 101 species constitute native plants, and 54 species include introduced species. From 155 species, about 43 species of the Family Asteraceae can be found in Central Sulawesi [8-13]. Kapopo Ngatabaru Great Forest Park is one of the reforestation programs implemented by the Indonesian government and inaugurated on December 17, 1990. Construction of the Kapopo Ngatabaru Great Forest Park based on the Indonesian Act. Number 5 of 1990 about determining area conservation sources that Power natural and ecosystems. Kapopo Ngatabaru Great Forest Park is in the Ngatabaru Village, Sigi Biromaru District, Sigi Regency, Central Sulawesi Province. Kapopo Ngatabaru Great Forest Park area is around 7,128 hectares and is located in a topography mountain plain tall with a slope of 8-60% and

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a height of 100-1,500 meters above sea level. In the Kapopo Grand Forest Park area of Ngatabaru, there are about 100 trees and 22 species of lianas. There are also epiphyte, saprophyte, and parasite species, 13 grass species, and five palm species [14].

However, the species from the Family Asteraceae in the Kapopo Ngatabaru Great Forest Park is not yet well-known. Because that is necessary, the study reveals diversity and benefits as well as types of species from the Family Asteraceae in the Kapopo Ngatabaru Great Forest Park. Consequently, further research can be conducted to explore the potential of the Family Asteraceae in the Kapopo Ngatabaru Great Forest Park.

2 Materials and Methods

2.1 Materials

Materials used in the study were a sample collected plants from Kapopo Ngatabaru Great Forest Park, 70% alcohol, garden scissors, a knife, a machete, plastic bags, writing tools, label paper, A3 papers, a camera, plant press, and oven.

2.2 Methods

The method used in this study was to explore track climbing in the Kapopo Ngatabaru Great Forest Park. Plant samples were collected from Family Asteraceae using a random sampling approach. After obtaining the samples, detailed photographs were taken, and the characteristics of the plants were noted to ensure accurate representation in the herbarium. Furthermore, the collected plant samples were brought to Laboratory Biosystematics Plant Major Biology Faculty of Mathematics and Natural Sciences, University Tadulako. Here, they were processed into dry herbarium specimens using a specific method. The plant samples obtained from the field were identified based on morphological characteristics, utilizing plant identification books, online plant identification sites, and relevant online literature. A comprehensive literature review determined the benefits derived from the collected plant samples.

3 Results And Discussion

Kapopo Ngatabaru Great Forest Park is in the Palu Valley. According to the Koppen climate classification, the Palu Valley has vegetation types, namely tropical monsoon forest and Bsh climate types (dry, semi-arid, steppe, and hot). The phenomenon of strong winds or rain shadow areas causes both things. The strong wind phenomenon occurs in the Palu Valley because the valley is surrounded by high mountains and the sea [15].

The geological structure of the Palu Valley, especially in the Kapopo Ngatabaru area, is composed of layers of alluvium and coastal deposit and metamorphic rock complexes. Alluvium and coastal deposit layers are composed of gravel, sand, mud, and coral limestone, which were formed in river, delta, and shallow sea environments that are Holocene in age. The metamorphic rock complex layer is composed of amphibolite schist, schist, gneiss, and marble, which has an age ranging from Palaeozoic to pre-Tertiary [16]. Based on the results of exploration on the hiking trails in Kapopo Ngatabaru Great Forest Park, five species were obtained from the Family Asteraceae: *Chromolaena odorata*, *Porophyllum ruderale*, *Eleutheranthera ruderalis*, *Synedrella nodiflora*, and *Tridax procumbens*.

3.1 *Chromolaena odorata* (L.) King & HE Robins



Fig. 1. *Chromolaena odorata*, a. & c. morphology, b. inflorescence

The diagnostic character of *Chromolaena odorata* is bush or shrub to 3 m. Stem erect, branch opposite. The leaves opposite, ovate-lanceolate, have three veins on the part base, and the margins coarsely dentate to the subentire. Inflorescence terminal. Flower complete, perfect capitula numerous in corymbs or compound corymbs, cylindric, discoid. Phyllaries 3- or 4-seriate. Corollas white. Achenes black-brown [17].

3.2 *Porophyllum ruderale* (Jacq.) Cass.

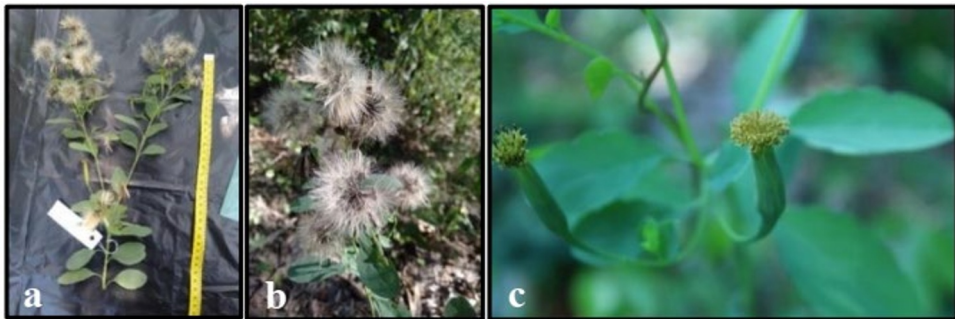


Fig. 2. *Porophyllum ruderale*, a. habitus, b. fruit, c. inflorescence

The diagnostic characteristic of *Porophyllum ruderale* is herbs. Stem erect, glaucous, tall to 1.5 m. Leaves opposite or alternate, oblong, elliptical or obovate, pinnately veined, glabrous, glaucous, margin undulate. Inflorescence corymbiform. Flower complete, perfect. Capitula cylindric. Phyllaries 5, glaucous. Corollas yellow. Achenes cylindric, black or brownish [17].

3.3 *Eleutheranthera ruderalis* (Swartz) Sch.-Bip

The diagnostic characteristic of *Eleutheranthera ruderalis* is herbs. Stems erect to 30 cm, glabrous, green, reddish, to 30 cm. Leaves opposite, ovate, 3-veined, both surfaces pubescent and glandular, margin entire or crenulate-dentate. Inflorescence terminal, Flower complete, perfect. Capitula 2-5, peduncles usually longer than capitula. Discoid. Phyllaries 2-seriate, outer slightly imbricate, ovate, inner paleaceous. Corolla yellow. Achenes brown [17].



Fig. 3. *Eleutheranthera ruderalis*, **a.** & **b.** habitus, **c.** inflorescence

3.4 *Synedrella nodiflora* (L.) Gaertn



Fig. 4. *Synedrella nodiflora*, **a.** & **b.** habitus, **c.** inflorescence

The diagnostic characteristic of *Synedrella nodiflora* is herbs. Stem erect or ascending to 80 cm. Leaves opposite, cauline, blade ovate, 3-veined, margin toothed. Inflorescence axillary and terminal. Flower complete, perfect. Capitula radiate, sessile, solitary, cylindric to campanulate. Phyllaries persistent, 2-5+, 1 (or 2)-seriate. Ray florets and Disk florets corollas yellow [17].

3.5 *Tridax procumbens* L.



Fig. 5. *Tridax procumbens*. **a.** & **b.** habitus, **c.** inflorescence

The diagnostic characteristics of *Tridax procumbens* is herbs, caulescent, decumbent. Stems procumbent, glabrous, to 50 cm. Leaves shortly petiolate, ovate to ovate-lanceolate, margin irregularly serrate. Inflorescence terminal. Flower complete, perfect. Capitula solitary, long peduncle to 30 cm, subcampanulate. Phyllaries seriate, glabrous, outer densely greyish white, inner purple, elliptic. Ray florets 3-6, white. The disk florets yellow. Achenes brown [17].

The five species from Family Asteraceae found in the Kapopo Ngatabaru Great Forest Park are introduced plants or non-native species of Indonesia. Those five species originate

from the American continent. *Chromolaena odorata*, previously known as *Eupatorium odoratum* (L.), is a native plant from the Southern United States to Northern Argentina; *Porophyllum ruderale* is a native plant from Tropical and subtropical America, *Eleutheranthera ruderalis* is a native plant from Tropical America, *Synedrella nodiflora* is a native plant from Tropical America, and *Tridax procumbens* is a native plant from Central America [18].

Table 1. Benefits of Asteraceae species in the Kapopo Ngatabaru Great Forest Park

No.	Species	Benefits	Secondary Metabolite Compounds	part of the plant used
1.	<i>Chromolaena odorata</i> (L.) King & HE Robins	antibacterial [19], anticancer [20], and antioxidants [21]	Chromomoric Acid [19]. Phenolics, alkaloids, terpenoids and cardiac glycosides [20] Soluble polysaccharides (PoS), pectins (Pec) and hemicelluloses (Hem) [21].	Leaf [19] [20] [21]
2.	<i>Porophyllum ruderale</i> (Jacq.) Cass.	Anti-inflammatory [22], insecticide [23], Antifungal and antibacterial [24]	Monoterpene beta-myrcene [22] [23] [24]	Leaf [22] [23] [24]
3.	<i>Eleutheranthera ruderalis</i> (Sw.) Sch. Beep.	treat wounds [25]	No Information	all parts of the plant [25]
4.	<i>Synedrella nodiflora</i> (L.) Gaertn.	Antioxidants [26], Anti-inflammatory [27], and Pesticides [28]	Steroids, Triterpenoids, Reducing sugars, Alkaloids Phenolic compounds, Saponins, Xanthoproteins, Tannin, Flavonoids, Anthraquinones, and Aromatic acids [26] [27] [28]	all parts of the plant [26] [27] [28]
5.	<i>Tridax procumbens</i> L.	Immunomodulator [29], anticancer [30], and anti-hyperglycemic [31]	triterpenoides and sesquiterpene [29] dexamethasone, luteoline, glucotureolin, β -sitosterol, flavone, glycoside and quercetin [31]	all parts of the plant [29] [30] [31]

Since these five species are not native to the region or were purposefully planted there, their presence in the Kapopo Ngatabaru Grand Forest Park is believed to be the result of unintentional seed or plant part dispersal caused by wind, human activity, and animal activity

[32]. Although all species of the Family Asteraceae found in the Kapopo Ngatabaru Great Forest Park are introduced plants, the species have a variety of benefits that can be seen in **Table 1**.

The Kaili tribe is an indigenous tribe that lives in the Palu Valley. The Kaili tribe uses various types of plants, including those from the Asteraceae family, in their traditional medicine. *Chromolaena odorata* is a plant species from the Asteraceae family used by the Kaili tribe to treat wounds [33].

4 Conclusion

The conclusion from the study is that There are five species of Family Asteraceae found in The Kapopo Ngatabaru Great Forest Park: *Chromolaena odorata*, *Porophyllum ruderale*, *Eleutheranthera ruderalis*, *Synedrella nodiflora*, and *Tridax procumbens*. The five species are introduced plants. The five species have their benefits, such as herbal medicine and pesticides.

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