

Diversity of Potentially Invasive Plants in Mount Padang, Padang City, West Sumatra, Indonesia

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Abstract. Invasive plants are species that reproduce rapidly and have the potential to threaten biodiversity by altering ecosystem structure and function. Mount Padang, a tourist destination in Padang City, West Sumatra, possesses high biodiversity and important ecological value, making it vulnerable to invasion by invasive plant species. This study aimed to inventory potentially invasive plant species occurring in Mount Padang and provide baseline information to support future conservation and management efforts. The study employed purposive sampling combined with area exploration along the Mount Padang trekking trail. Twenty plots measuring 2 × 2 m were established, and plant species found within the plots and along the observation trail were recorded and identified using A Guide Book to Invasive Alien Plant Species in Indonesia. Additional environmental parameters, including geographical coordinates, elevation, sunlight exposure, soil moisture, soil conditions, and conservation status based on the IUCN Red List, were also documented. The results recorded 39 potentially invasive plant species belonging to 22 families. Asteraceae was the dominant family, represented by 10 species, followed by Poaceae with 4 species. Nine species were categorized as Least Concern according to the IUCN Red List. The high abundance of invasive plants was associated with favorable environmental conditions, particularly open topography and high sunlight intensity, which facilitated their establishment and spread. The presence of invasive plants poses a significant threat to biodiversity by suppressing native plant populations, altering ecosystem processes, reducing habitat quality, and potentially affecting the tourism value of Mount Padang. Therefore, continuous monitoring and effective management strategies are necessary to mitigate the impacts of invasive plants and maintain ecological balance in Mount Padang.

Keywords: Biodiversity, Invasive Plants, Inventory, Mount Padang, West Sumatra.

1. Introduction

Invasive plants are native or non-native plant species whose growth can disrupt the stability of an ecosystem through aggressive dominance, resulting in a decline in environmental quality and biodiversity over both short and long periods (Widjaja et al., 2014). Invasive plants are defined as plant species that are able to survive and reproduce outside their natural habitats and possess the ability to dominate new vegetation communities or habitats. Their establishment and spread are supported by several factors, including environmental conditions. In general, invasive plant species exhibit additional characteristics, such as altering the structure and composition of native plant habitats and lacking natural enemies in the invaded areas. Invasive plants are recognized as species that threaten the integrity of natural and semi-natural ecosystems and can have severe negative impacts on both flora and fauna communities (Tjitrosoedirdjo et al., 2016). Invasive plants are species that are not native to an ecosystem and have the potential to cause ecological, economic, and human health damage. These plants spread rapidly and dominate new habitats, disrupting the balance of natural ecosystems. On Mount Padang, the presence of invasive

plants threatens local plant species, alters ecosystem structure and function, and reduces biodiversity.

Invasive species initially originate from naturalized species. Naturalized species are species that continuously reproduce and maintain their populations for several generations without direct human intervention. After becoming well established, some naturalized species threaten the growth and survival of native species and produce offspring in areas far from their original introduction sites. These naturalized species are then classified as invasive species. It is estimated that approximately 50% of invasive species have harmful ecological impacts. Invasive plant species that pose the greatest threat to ecosystems and habitats generally lack natural enemies, possess highly effective reproductive and vegetative propagation mechanisms, spread easily, and rapidly form dense cover. They are commonly found among shrubs, climbing plants, herbaceous plants, trees, and palm species. Differences between native and exotic plant species in resource acquisition and utilization can alter soil structure, decomposition processes, and soil nutrient content. Therefore, invasive plant species and their impacts represent a major challenge to conservation efforts (Srivastava et al., 2014).

The process of plant invasion in an area does not occur immediately or simultaneously but rather develops gradually, beginning with the introduction and establishment of invasive species, followed by changes in the habitat. Invasive plants eventually dominate an area due to their rapid growth and dense root systems. This dominance is facilitated by effective local pollination, which enables invasive plants to produce seeds rapidly and in large quantities. Seed dispersal also occurs efficiently because the fruits of invasive plants are often preferred by animals, while their lightweight seeds can be easily carried by the wind. The large number of seeds produced further accelerates the spread and establishment of these species, allowing them to dominate surrounding areas. In addition, allelopathic compounds produced by invasive plants inhibit the growth and development of native plant species, thereby increasing their competitive advantage (Tjitrosoedirdjo et al., 2016).

West Sumatra is located on the western coast of central Sumatra and is a region characterized by diverse and beautiful natural landscapes, consisting of lowlands and highlands along the western coast that are surrounded by the Bukit Barisan mountain range. These naturally formed landscapes possess significant ecological service potential if they are properly managed. Mount Padang is one of the tourist destinations in Padang City managed by the Padang City Department of Tourism and Culture. This area offers various tourist attractions, including natural scenery, historical relics from the Japanese colonial period in the form of bunkers, a tomb believed to be that of Siti Nurbaya, Siti Nurbaya Park, and the iconic Padang City tagline, "Padang Kota Tercinta" (Padang, the Beloved City). Tourist activities at Mount Padang include fishing, mountain climbing, sightseeing, picnicking, hiking, and community service activities. In addition, the biodiversity of flora and fauna, which encompasses various coastal and lowland forest ecosystems, has considerable potential for educational and research purposes (Lerissa, 2014).

Research on invasive plants at Mount Padang is important because of their impacts on ecosystems, conservation, and cultural heritage. Invasive plants disrupt natural ecosystems by outcompeting native vegetation, damaging rock structures and archaeological artifacts, and reducing biodiversity. Through this research, invasive plant species can be identified and managed to protect native species and maintain ecological balance. An inventory is conducted to identify the species composition and diversity of invasive plants found on Mount Padang. The findings of this study are expected to assist the government and relevant institutions in formulating effective environmental management policies. This research is essential for protecting the flora, fauna, and the cultural and historical heritage of Mount Padang. Furthermore, the study provides information on the species composition and diversity of invasive plants at Mount Padang, which can serve as a reference for future management and conservation efforts.

Based on previous research conducted by Putri (2025), further investigation is needed to provide updated information on the density, distribution patterns, and spatial mapping of the dominant species *N. fruticans* in the mangrove tourism area of Nagari Mandeh. The findings of this study are expected to serve as a foundation for management and conservation efforts, as well as for preventing the expansion of nipa palm dominance, which may potentially disrupt the ecological functions of mangrove forests as coastal protectors and as natural barriers against wave-induced erosion in the Nagari Mandeh area, Pesisir Selatan.

2. Research Methods

a. Study Area

The study was conducted at Mount Padang, Padang City, West Sumatra, Indonesia. The research location was selected purposively by considering the trekking trail of Mount Padang as a representative area of the ecosystem. The study area consists of various environmental conditions that potentially influence the distribution of invasive plant species (Figure 1).

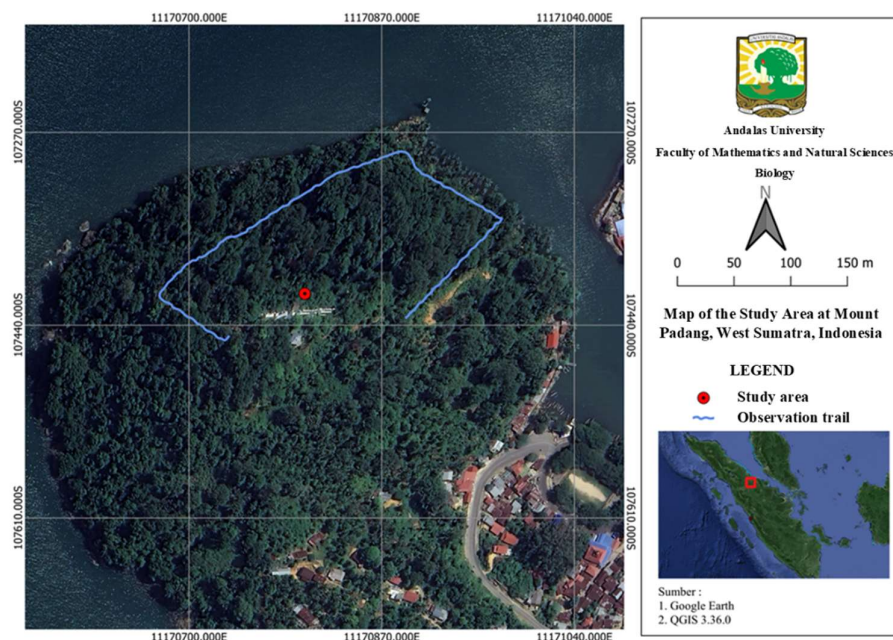


Figure 1. Research Location Map

b. Data Collection

Data were collected using purposive sampling combined with area exploration. Twenty plots measuring 2×2 m were established along the Mount Padang trekking trail. Plant species within each plot and along the trekking trail were observed to identify potentially invasive plants. The characteristics of each plant, including species name, number of individuals, and location of occurrence, were recorded using data sheets and identified using *A Guide Book to Invasive Alien Plant Species in Indonesia*. Additional parameters observed included geographical coordinates, elevation, and environmental factors that may influence the distribution of invasive plants. The environmental variables observed consisted of sunlight exposure, soil moisture, and soil conditions. The equipment used in this study included a smartphone, camera, GPS device, stationery, an invasive plant identification guidebook, and data sheets.

c. Analisis Data

The identified species were further analyzed by assessing their conservation status using the IUCN Red List. The inventory data were used to determine the species composition and diversity of invasive plants found at Mount Padang and to evaluate their conservation status.

3. Results and Discussions

Table 1. List of Invasive Plant Species Recorded on Mount Padang, West Sumatra, Indonesia

No.	Family	Species	Local Name	IUCN Red List Status
1	Acanthaceae	<i>Dyschoriste linearis</i> (Torr. & A.Gray) Kuntze	Bunga Tanjung	-
2	Acanthaceae	<i>Thunbergia laurifolia</i> Lindl.	Bunga madia	-
3	Acanthaceae	<i>Asystasia gangetica</i> (L.) T.Anderson	Rumput israel	-
4	Amaranthaceae	<i>Cyathula prostrata</i> (L.) Blume	Bayam pasir	-
5	Arecaceae	<i>Arenga pinnata</i> (Wurmb) Merr.	Enau	LC
6	Aristolochiaceae	<i>Apama tomentosa</i> (Blume) Engl.	Singa depa	-
7	Asteraceae	<i>Ageratum conyzoides</i> L.	Bandotan	-
8	Asteraceae	<i>Cyanthillium cinereum</i> (L.) H.Rob.	Sawi langit	-
9	Asteraceae	<i>Synedrella nodiflora</i> (L.) Gaertn.	Jotang kuda	-
10	Asteraceae	<i>Mikania micrantha</i> Kunth	Sembung rambat	-
11	Asteraceae	<i>Praxelis clematidea</i> (Hieron. ex Kuntze) R.M.King & H.Rob.	Bebendotan	-
12	Asteraceae	<i>Elephantopus mollis</i> Kunth	Sawi dayak	-
13	Asteraceae	<i>Cosmos caudatus</i> Kunth	Kenikir	-
14	Asteraceae	<i>Acanthospermum hispidum</i> DC.	Rumput duri	-
15	Asteraceae	<i>Strachium sparganophorum</i> (L.) Kuntze	Awa lanaru	-
16	Asteraceae	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Kirinyu	-
17	Campanulaceae	<i>Hippobroma longiflora</i> (L.) G.Don	Kendali	-
18	Cleomaceae	<i>Cleome rutidosperma</i> DC.	Maman ungu	-
19	Costaceae	<i>Costus speciosus</i> (J.Koenig) Sm.	Daun pacing	-
20	Cucurbitaceae	<i>Luffa acutangula</i> (L.) Roxb.	Gambas	-
21	Cyperaceae	<i>Cyperus rotundus</i> L.	Rumput teki	LC
22	Cyperaceae	<i>Cyperus nemoralis</i> Cherm.	Rumput kenop	-
23	Fabaceae	<i>Mimosa diplotricha</i> C.Wright	Putri malu raksasa	-
24	Lamiaceae	<i>Hyptis capitata</i> Jacq.	Rumput Knop	-
25	Malvaceae	<i>Urena lobata</i> L.	Pulutan	LC
26	Melastomaceae	<i>Melastoma malabathricum</i> L.	Senduduk	-
27	Muntingiaceae	<i>Muntingia calabura</i> L.	Kersen	LC
28	Oxalidaceae	<i>Oxalis barrelieri</i> L.	Belimbing tanah	-
29	Phyllanthaceae	<i>Phyllanthus urinaria</i> L.	Meniran	-
30	Piperaceae	<i>Piper aduncum</i> L.	Sirih hutan	LC
31	Poaceae	<i>Paspalum conjugatum</i> P.J.Bergius	Rumput paitan	LC
32	Poaceae	<i>Centotheca lappacea</i> (L.) Desv.	Suket Lorodan	-
33	Poaceae	<i>Axonopus compressus</i> (Sw.) P.Beauv.	Rumput gajah	LC
34	Poaceae	<i>Digitaria ciliaris</i> (Retz.) Koeler	Rumput ceker ayam	-
35	Rubiaceae	<i>Borreria laevis</i> (Lam.) Griseb.	Rumput kancing	-

36	Rubiaceae	<i>Diodia virginiana</i> L.	-	-
37	Rubiaceae	<i>Spermacoce ocyimifolia</i> Willd.	-	-
38	Solanaceae	<i>Physalis peruviana</i> L.	Ciplukan	LC
39	Verbanaceae	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Pecut kuda	LC

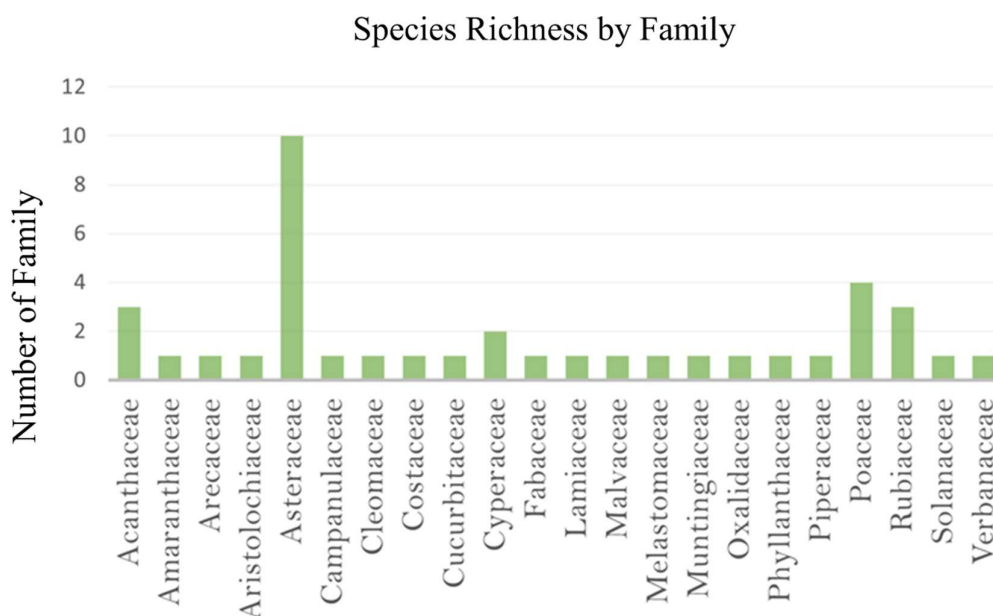


Figure 2. Species Richness Across Plant Families

Table 1 shows that 39 potentially invasive plant species belonging to 22 families were recorded on Mount Padang. The inventory results indicated that the most abundant invasive plant family found on Mount Padang was Asteraceae, with 10 species identified, namely *Ageratum conyzoides*, *Cyanthillium cinereum*, *Synedrella nodiflora*, *Mikania micrantha*, *Praxelis clematidea*, *Elephantopus mollis*, *Cosmos caudatus*, *Acanthospermum hispidum*, *Struchium sparganophorum*, and *Chromolaena odorata*. The dominance of the Asteraceae family observed in this study was supported by Azzaroiha et al. (2022), who stated that Asteraceae is one of the most diverse families and has the second-highest number of species in the Kingdom Plantae. This family comprises approximately 24,000 to 30,000 species and around 1,600 to 1,700 genera, making it one of the dominant plant families worldwide. Asteraceae is widely distributed across the globe, including in Indonesia, and is capable of growing in various environmental conditions, which contributes to its high species richness. Several invasive plant species found on Mount Padang were classified as Least Concern according to the IUCN Red List. Although the Least Concern category is currently not considered highly alarming, the absence of preventive measures against exploitation and habitat degradation may lead to changes in their conservation status and threaten species sustainability. This situation may become more severe if more serious conservation and management efforts are not implemented (Hartini, 2016).

Figure 2 shows that, after Asteraceae, Poaceae was the second most abundant family, with four species identified, namely *Paspalum conjugatum*, *Centotheca lappacea*, *Axonopus compressus*, and *Digitaria ciliaris*. The Poaceae family is one of the most abundant invasive plant families, comprising approximately 500 genera and 8,000 species. The high abundance of Poaceae is attributed to its ability to grow and survive in almost all open and sheltered habitats in tropical and subtropical regions. Poaceae species were easily found throughout the study area because their seeds disperse rapidly and their growth rate is relatively fast (Diana et al., 2022).

The invasive alien plant species commonly found in this study predominantly exhibited an herbaceous growth form and constituted the ground vegetation layer. This condition was attributed to the ability of ground vegetation to grow and develop well in unshaded environments with sufficient sunlight intensity (Sahira et al., 2016). Ground vegetation was able to thrive at the study site, which is a hill located along the coast of Padang City. This hill provided suitable conditions for the growth of ground vegetation because its open topography allowed abundant sunlight exposure, enabling understory plants to develop optimally. In addition to serving as a tourist destination, Mount Padang also functioned as a habitat for various plant species that were able to grow well under relatively high light intensity.

Competition between invasive alien plants and native species occurred in several forms, including competition for the same ecological niches occupied by native species, disruption of food webs, reduction of biodiversity, and the local extinction of other species. Invasive plants affected native vegetation by smothering surrounding plants, threatening nearby plant populations, reducing habitat quality, disrupting natural aesthetic values, and hindering the movement of large fauna within an area (Hermawan et al., 2017). Such competition could lead to ecosystem degradation on Mount Padang, where favorable environmental conditions and topography allowed invasive plants to grow vigorously and become dominant, thereby potentially suppressing the growth of native plant species and disrupting local ecological balance.

The presence of invasive plants posed a threat to the biodiversity of Mount Padang and, if left unmanaged for a prolonged period, could lead to forest biodiversity degradation. Their rapid growth and development enabled them to replace existing native species. This finding was consistent with Khoerunnissa (2024), who stated that various environmental conditions that support the growth of invasive plants constitute a serious threat to native plant diversity because the dominance of invasive plants can replace native vegetation. Favorable conditions, such as sufficient sunlight exposure and rapid reproductive capacity, facilitated the establishment and growth of various invasive plant species in the area. Tjitrosoedirdjo and Setyawati (2016) also stated that invasive alien plants possess distinctive characteristics, including rapid reproduction, extensive dispersal ability, adaptability to diverse environmental conditions, and the ability to survive under varying nutrient availability, enabling them to persist in a wide range of habitats despite differences in nutrient supply.

The threats posed by invasive plants included changes in ecosystem structure and function, as invasive species dominated space and resources that were previously utilized by native species. This condition could lead to declines in native plant populations and the loss of habitats for fauna that depended on native vegetation. In addition, invasive plants could accelerate soil erosion, particularly in hilly areas such as Mount Padang, reduce water quality, and disrupt the natural cycles of ecosystems. These impacts not only degraded local ecosystems but also had significant economic consequences, especially for the tourism sector at Mount Padang, which depended on a healthy ecosystem. Thapa et al. (2018) stated that the threats posed by invasive plants were substantial, ranging from ecosystem degradation to biodiversity loss, and could alter nutrient and hydrological cycles within native ecosystems. Therefore, further management measures were required to address the presence of invasive plants. Moreover, the threats associated with invasive plants had become an important topic of discussion in many countries within the context of biodiversity conservation because their control and management required considerable financial resources.

4. Conclusions

In conclusion, the inventory study of invasive plants on Mount Padang recorded 39 plant species belonging to 22 families with invasive potential. The Asteraceae family was the most dominant, comprising 10 species, followed by the Poaceae family with 4 species. The abundance of invasive plants on Mount Padang was supported by favorable environmental conditions, such as high sunlight intensity and open topography, which facilitated their growth and establishment. The presence of invasive plants threatened biodiversity, reduced native plant populations, and degraded ecosystems through competition for resources. These impacts not only damaged ecosystems but also had economic consequences, particularly for the tourism sector, and diminished the aesthetic value of the area. Therefore, further studies and management efforts targeting invasive plants were considered essential, despite requiring substantial financial resources, to protect biodiversity and maintain ecological balance on Mount Padang.

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