

The Invasive Plants Species along the Hiking Track of Mount Panderman Nature Tourism, Batu, East Java

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Abstract

Indonesia has the highest biodiversity that places ecotourism as a sustainable development sector. The negative impact of ecotourism is the vulnerability to invasive plant species growth. They invade the habitat of the native plants and potentially alter the biodiversity balance. This invasive plant introduction is predicted caused by tourist and hiker visits. Therefore, the inventory of invasive plant species is urgently needed. The field survey was conducted on March 11-12, 2017 to inventory invasive plant species along the Panderman Mountain hiking track that common travelers explored and then identified. Species of *Pinus Caribaea*, *Chromolaena odorata*, *Lantana camara*, *Leucaena leucocephala*, *Pennisetum purpureum* are categorized invasive plants. Four species of plants otherwise potentially invasive include *Calliandra calothyrsus*, *Ageratum conyzoides*, *Bidens pilosa*, and *Acacia deccurens*. The widespread access to protected environmental destinations leads to the spread of highly invasive species. The impact of invasive species depends on factors such as reproduction rate, vegetative phase, adaptability of seeds that can withstand adverse conditions and in particular human vectors as a way of spreading them.

Keywords: Batu, Ecotourism, Hiking track, Invasive plants, Panderman Mountain.

INTRODUCTION

Indonesia is an archipelago located between two continents (Asia and Australia) and two oceans (Pacific and India) possessing a wealth and very high diversity. With its geographical landscape, Indonesia has a vast territory of approximately 1.913 million km² of land, with 17,504 islands, 3.1 million km² of the territorial sea, and an area of 2.7 million km² [1] of ZEE (Exclusive Economic Zone). Based on the distribution of biodiversity in the world, Indonesia is not only rich in genetic and species diversity, but ecosystem diversity that places Indonesia as the country with the greatest biodiversity after Brazil. Therefore, conservation efforts in Indonesia are also very important, due to the potential of new species brought and grown by humans [2].

Types of the alien species in new strains and varieties can provide economic benefits as well as a direct contribution to the welfare of the people. The alien plants species that entering a new ecosystem have the potential to adapt and compete with the native species inhabited. However, there are species of the alien plants

that capable to spread and grow rapidly, and displace the existence of a living endemic species called the Invasive Alien Species (IAS) [3].

The introduction of new species has an effect on the balance of the world's ecosystems. Indonesia, which included in ten countries with the highest biodiversity in the world, has an important position in the biodiversity of the world [4]. Directly, invasive alien species can be a cause of reduced biodiversity and world diversity.

Invasive species are emerged in habitats that were often brought by humans, which did not previously exist in the habitat, then grew and spread on their own. Invasive species are one of the main threats to current conservation that cause many extinct species. The most dominant invasive species are species introduced from other habitats, although some endemic species have become invasive in their new habitat [5].

Tourists may be one of the distributors and vectors of indirect species distribution. In terms of Ecotourism, the opening of tourist access into protected areas causes the spread of alien species to be more vulnerable [6]. The opportunities for invasive species to spread by tourists as vectors are higher and lead to the spread of cross-country disease [7].

Further research revealed that nature tourism in Indonesia has been threatened by Invasive Plant Species. Unconsciously, tourists

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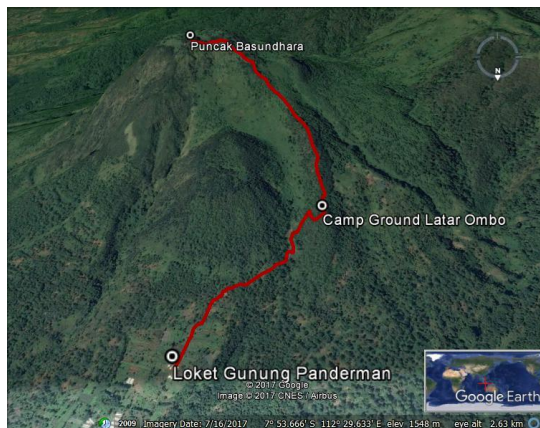
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can bring alien plants and have the potential to shift endemic plants from their habitat [8]. Mount Panderman is a popular natural hiking site in East Java which is thought to have many alien plant species. Therefore, there should be a study on diversity and invasive plants spreading. This study aimed to analyze the diversity of invasive plants and their distribution along the Mount Panderman Nature Hiking Track, Batu, East Java.

MATERIALS AND METHOD

Study Area

Panderman Mountain is one of the most active volcanoes in Indonesia located in Batu, East Java Indonesia (7 ° 54'03.7 "S 112 ° 29'51.0" E) with an elevation of 2045 m asl and is included in the Cluster of Putri Tidur Mountain of Mount Kawi, Butak and Panderman (Fig. 1). This mountain is well known as a popular hiking site with two hiking paths namely the hamlet of Toyomerto, Pesanggrahan village which is the common route and the Curah Banteng line [9]. The study was conducted on a common path through which hikers started at the payment counter (1344 m asl), Camp Ground Latar Ombo (1733 m asl), continued to the top of Basundhara (2045 m asl). The total distance traveled during the study is about ± 2.5 km.



Figures 1. Panderman Mountain Nature Tourism Hiking Track recorded using GPS

Sampling

The Field Survey was conducted on March 11-12, 2017 to find out the diversity and invasive plant distribution along the Panderman Mount trajectory that explorative hikers travel through. The exploratory lane is recorded using GPS and then the invasive alleged plant at the site is measured in height and marked its location using GPS.

Identification

Identification of plants is directly done by using literature, books, and articles, such as Flora of Java [11]. The determination of invasive plants was carried out by using literature [12], which was checked on the database of SEAMEO Biotrop and the State Ministry of the Environment [13], and several other databases such as ISSG - Invasive Species Specialist Group [14], ISC - Invasive Species Compendium [15], PIER - Pacific Island Ecosystem at Risk [16] and existing Forest Vegetation Analysis [17,18].

RESULT AND DISCUSSION

The results of Inventory indicate that 16 plants can be found along the Hiking track of Mount Panderman Nature Tourism. Based on the results of research that has been done, we found *Pinus caribaea*, *Chromolaena odorata*, *Lantana camara*, *Leucaena leucocephala*, *Pennisetum purpureum* and classified to 5 Invasive plant which is an alien plant. *Calliandra* sp., *Agaratum conyzoides*, *Bidens pilosa*, and *Acacia deccurens* belong to 4 potentially invasive plants that are alien plants, and 7 endemic plants are found including *Anaphalis javanica*, *Gigantochloa apus*, *Cycas rumphii*, *Musa* sp, *Eucalyptus alba*, *Urena lobata*, and *Adiantum capillus-veneris* along the Hiking Track of Panderman Mountain Nature Tourism.

Invasive Species Plant Diversity

Sixteen plants have been identified with 5 invasive alien species, 4 potentially invasive alien species, and 8 endemic species (Table 1). The species that categorized as invasive plant are species that disrupt the balance and biodiversity due to the nature of the allelopathy belonging to several species to prevent the growth of other species. Otherwise, species that are categorized potentially invasive is because of their ability to survive in harsh environments, and the most of the result are successions and cultivars.

Pinus caribaea belongs to the family of the *Diploxylon pinus*, there are three varieties of *P. caribaea* known as *P. caribaea* var. *Caribaea*, *P. caribaea* var. *Bahamensis* and *P. caribaea* var. *Hondurensis* (Fig. 2a) [13]. Caribbean Pine (*P. caribaea*) is a medium-sized pine tree with straight rods, cylinders, and round crowns. The needle-shaped leaf, cone seeds, and wing anatomy characterize the distinction between each variety. The lower branches are usually long, lean and sag, while the upper branches often lead upright.

Table 1. List of Plant Species Found along the Mount Panderman Nature Hiking Track

No	Species	Family	Habitus	Locality	Status
1	<i>Pinus caribaea</i>	Pinaceae	Tree	Alien	Invasive
2	<i>Chromolaena odorata</i>	Asteraceae	Shrub	Alien	Invasive
3	<i>Lantana camara</i>	Verbenaceae	Shrub	Alien	Invasive
4	<i>Leucaena leucocephala</i>	Mimosaceae	Shrub to small tree	Alien	Invasive
5	<i>Pennisetum purpureum</i>	Poaceae	Grass	Alien	Invasive
6	<i>Calliandra calothyrsus</i>	Fabaceae	Tree	Alien	Potentially Invasive
7	<i>Ageratum conyzoides</i>	Asteraceae	Herb	Alien	Potentially Invasive
8	<i>Bidens pilosa</i>	Asteraceae	Herb	Alien	Potentially Invasive
9	<i>Acacia deccurens</i>	Mimosaceae	Shrub to small tree	Alien	Potentially Invasive
10	<i>Anaphalis javanica</i>	Asteraceae	Shrub to small tree	Native	-
11	<i>Gigantochloa apus</i>	Poaceae	Grass	Native	-
12	<i>Cycas rumphii</i>	Cycadaceae	Tree Fern	Native	-
13	<i>Musa sp.</i>	Musaceae	Herb	Native	-
14	<i>Eucalyptus alba</i>	Myrtaceae	Tree	Native	-
15	<i>Urena lobata</i>	Malvaceae	Shrub	Native	-
16	<i>Adiantum capillus-veneris</i>	Adiantaceae	Rhizome fern	Native	-



Figures 2. Invasive plant documentation (a) *P. caribaea*, (b) *C. odorata* (c) *L. camara*, (d) *L. leucocephala*, (e) *P. purpureum*, (f) *Calliandra sp.*, (g) *A. conyzoides*, (h) *B. pilosa*, and (i) *A. deccurens*

Although it can grow as high as 45 meters the caribbean pine typically reaches a height of 20 to 35 meters and has a stem diameter of 50 to 100 centimeters. The skin of this plant is reddish-brown to grayish and is divided by rough and irregular cracks with leaves like needles [19]. Further research reveals that the pine leaves release an allelopathic substance that inhibits the growth of other plants around it. In a row of pine forests, clean floors can be seen and few plants survive pine allelopathy [20].

Chromolaena odorata (L.) King & Robinson (*Rumput Golkar*) comes from the Asteraceae or Compositae family (Fig. 2b). The other names of this species are *Eupatorium affine* Hook & Arn., *E. brachiatum* Wikstrom, *E. clematitis* DC., *E. conyzoides* M. Vahl [14,16]. This plant belongs to the perennial shrubs, grow upright, height about 1.5-2 m very rarely reaches the maximum height, is a climbing plant. The leaves are facing, reddish-brown when young, toothed leaves, young leaves have a distinctive (aromatic) smell. Flowering are terminal or axillary, homogamous, flowering up to 20-35, Comes with bridal cover involucre, imbricata, Comes with a large and short purple flowered head with a distinctive odor. The seeds are linear, elbows, brown or black, 5 mm long. Pappus white coarse fur, with a length of 5 mm [13]. These plants include as invasive species that are harmful to plantation crops such as coffee, oil palm plantations, and forests. *Chromolaena odorata* is bush that will prevent the growth of other species, due to competition factors and its allelopathic properties. In dry conditions, these plants become the cause of forest fires, and the causes of diseases such as skin diseases, asthma and allergies [13,14].

Lantana Camara L. (*tembelek-tembelean*) belongs to the Verbenaceae family (Fig. 2c). Another name for this plants is *Camara vulgaris* and *Lantana scabrida* [14,16]. These plants include as perennial bushes with a sharp smell, with a height of 1-3m. The stems grow upright and scattered, with stiff and small hair pointing down large. Both leaves are opposite, oval shaped, with toothed margins, 5-9 cm long, 2-7 cm wide, upper hairy coat and fluffy bottom. The length of the petiole reaches 1 cm. Flowers attached to leaf axils, with short rachis,

numerous inflorescences, 2-3.5 cm in diameter, with varied colors such as pink, red, yellow or orange. Fruit of two seeds, egg length drupe with diameter 4-6 mm [13]. In other habitats, the spread of these plants is so large that it is said to inhibit the regeneration of the rain forests for 3 decades. Allelopathic properties possessed by these plants can reduce the grow and productivity of the surrounding plants [14,15].

Leucaena leucocephala (Lam.) De wit (*Lamtoro*) is belongs to the Mimosaceae family (Fig. 2d). Other names for this species is *Acacia leucocephala* (Lamark) Link 1822, *L. glabrata* Rose 1897, and *L. glauca* (L.) Benth. 1842 [14, 16]. *Leucaena leucocephala* has a characteristic shrub or small tree up to 10 m high. Bipinnate leaves, alternate, with 3-10 pairs of pinnae, 20cm long, with orbicular glands under a pair of proximal from pinnae; leaves opposite, linear to oblong. Inflorescence attached to axillary / terminal panicles, white flowers, in the glomerules pedunculate there are 3 pieces. The fruit is pod, membranous, straight, brown and cracked seeds 15-30 per pod, ovoid, shrink [13]. *Leucaena leucocephala* has long existed in Indonesia due to the its various benefits, but eventually this plant became a species that invaded various tropical regions. They are difficult to remove after they grow and their habitat can not be exploited or traversed and threatens existing endemic plants [14,15].

Pennisetum purpureum Schumach (*Rumput Gajah*) comes from the family Poaceae or Gramineae (Fig. 2e). Other names for this species is *Cenchrus purpureus* (Schumach.) Morrone., *Pennisetum benthamii* Steud., *P. benthamii* var. *nudum* Hack., *P. benthamii* var. *sambesiense* Hack., *P. benthamii* var. *ternatum* Hack., and *P. blepharideum* Gilli [14,16]. *Pennisetum purpureum* is a 4 m perennial grass, a branched stem at the top, grayish internodes. Build leaves are parallel to oval, flat, turquoise with a length of 1 m and 3 cm wide, rough leaf edge, sturdy leaf bone. The inflorescence of the rough terminals is purplish brown, with a length of 20 cm and 2 cm wide. Spikelets have a length of 4-6 mm, clustered to 2-6 on axes and hairy. [13]. This species is spread by its vegetative growth and is found in extensive habitats. If this species is invasive, it will form a thick grass with a length of about 3 m in humus-rich soil, replacing native vegetation and regeneration of endemic plant. This species has a deep root system, seeds are rarely produced, hard to burn, and when the trunk is cut, it will regenerate. *Pennisetum*

Purpureum is a grass that grows rapidly, and colonizes new areas and forms dense clumps. It can alter the balance of the ecosystem. *Pennisetum Purpureum* is adaptable to dry conditions and has the ability to grow from a basal piece of stem [14,15].

Calliandra calothyrsus (*Kaliandra*) belongs to the Fabaceae family (Fig. 2f). Species of *Kaliandra* in Indonesia include *C. calothyrsus* Meissn., *C. haematocephala* Hassk., and *C. surinamensis* Benth [16]. The habitus of this species is shrubs, woody stems, bushes, height reaches 45 meters and roots can reach a depth of 1.5-2 m. *Kaliandra* grows well in all soil types and has the ability to grow fast, resistant, deep root system and able to form root nodules as a result of symbiosis with *Rhizobium*. *Kaliandra* is grown for wood use as firewood, greening the land, and feeding cattle. Currently this type of species has been widely grown in many tropical countries, especially in Southeast Asia, for the benefit of agroforestry. This type of legume plant is easy to plant and its growth is fast, its seed productivity is big enough, and it is easy to adapt to new environment. This causes the spread of this plant to extend as a result of the human vector for its usefulness [16, 10].

Ageratum conyzoides L. (*Bandotan*) is from the Asteraceae or Compositae family (Fig. 2g). The other names of this species are *A. cordifolium* Roxb., *A. hirsutum* Lam., *A. hirtum* Lam., *A. humile* Salisb., *A. mexicanum* Sims., *A. nanum* Hort. Ex Sch. Beep [14,16]. This species belongs to seasonal herb, erect, with a height of 20-80cm. Long stems, hairy, with many branches that appear from the base of the branch. The lower leaves with long stems will be opposite to the upper leaves with short branches, rough surfaces and visible leaf bone, pointed tip, narrowed to the base of a hairy petiole with a length of 2-3cm. Inflorescent terminals with many branches, each branch of which there are flowers that are protected bractea amounted to 2-3 parallel [13]. Research shows that extracts from these plants can inhibit the germination of plants such as amaranthus, *Oryza*, and wheat. Therefore *A. conyzoides* belong to plants that have allelopathic properties [13,15].

Bidens pilosa (*Ketul*) this species is from the Asteraceae or Compositae family (Fig. 2h). Other names for this species are *B. Sundaica* Blume, *B. leucorrhiza* (Lour.) DC., *B. Pilosa* L. var. *minor* (Blume) Sherff [14,16]. *Bidens pilosa* is an annual herb, grows upright, smells typical (aromatic), with a height of about 15-100 cm. The trunk is

cylindrical and often branched. The leaves are facing, with 3-5 leaves, awakened leaves with jagged edges. Flower terminal/aksilar with red or yellowish flowers, has a flower crown of 5-7 [13, 14]. *Bidens pilosa* lives on moist soil, flowering all year long. Seeds will be stored for 3-5 years which then germinate which of course requires light and aeration. *Bidens pilosa* prevents regeneration from other plants or is alelopathic. Leaf and root content is known to suppress germination process and germination of other plants through decomposition process. *Bidens pilosa* grows three times faster than other similar plants [13,14].

Acacia deccurens (Akasia) comes from the Fabaceae Family (Fig. 2i). The other names of this species is *A. angulata* Desv., *Mimosa angulata* (Desv.) Poir., *M. decurrens* Wendl., and *Racosperma decurrens* (Willd.) Pedley [14,16]. *Acacia deccurens* grows upright with a height of 5-15m, with lateral branching. The rod is smooth, gray-black, bipinnate leaf is dark brown and shiny, contains 4-15 pinnulas. The child leaves parallel to almost oval. This plant is diurnal that opens when there is stimulation of sunlight, and closes at night. Flowering about 15-30 head flowers on aksilar raceme. Longitudinal seed with short aryl [13]. *A. deccurens* becomes a serious problem in various regions of Australia, Hawaii, and New Zealand due to its rapidly spreading and nutrient-depleting roots. Heavy stature has a negative impact on existing biodiversity [15,21].

Distribution of Invasive Plant Species

Distribution of plants found along the Mount Panderman Nature Tourism Hiking Track commences from the Counters checkpoint, Latar Ombo campground to Basundhara peak from the height of 1423 to 2046m asl. The distribution of plants found along Mount Panderman Nature Tourism Hiking Track is shown on Table 2.

Pinus caribaea is found at an altitude of 2016 m asl. It grows widely in tropical and subtropical Africa. In its natural habitat in Central America and in the Caribbean basin, these plants grow both in lowland (about 700 m asl) and in fertile soils with an average annual rainfall of 1200 mm per year and average annual temperatures ranging from 20°C up to 27°C. In Africa, these plants are reportedly adaptable to various climates and elevations. In Uganda, the plant is able to grow well in shallow soil in lowland locations and performs well in fairly dry places. Overall, *Pinus caribaea* is recommended for growth in the central, west, north, and southern

regions of the country [14,15,22]. This plant is able to adapt and grow in different climates and different elevations allegedly causing its spread to be found widespread and disrupt other endemic plants.

Chromolaena odorata is found at an altitude of 2021 m asl and is usually found in places that are dry, barren (arid). It originated from the tropical forests of Latin America and Central and spread to Asia as a Alien species [14,15]. *Chromolaena odorata* are considered invasive weeds in fast-growing fields. This plant originated in South America and Central America and has been introduced into the tropical regions of Asia, Africa and the Pacific [14,23]. *Chromolaena odorata* grows in various soil types and grows in different types of vegetation, eg forest vegetation (annual rainfall 1500 mm), grasslands and arid (annual rainfall less than 500 mm). This plant is usually found in the lowlands of about 50-1000 mbsl [13,23]. The spread of invasive plants at different elevations is thought to be caused by human vectors as intermediaries and their adaptability.

Lantana Camara is found at an altitude of 1680 m asl and is derived from an American tropical forest, and is the worst invasive plant species in the world. [13, 15]. *Lantana camara* now spread to nearly 60 countries, namely New Zealand, Mexico, Florida, Trinidad, Jamaica and Brazil. Reportedly in many African countries including Kenya, Uganda, Tanzania and South Africa. Currently *L. camara* is distributed throughout India [14,24]. Habitat is found in plantations (tea, rubber, oil palm, sugar cane), secondary forests, sometimes forming dense forests, and cultivated as fence plants. In Java has been naturalized and found at an altitude of $\pm 1-1700$ m asl [13].

Leucaena leucocephala is found at an altitude of 2021m asl. This species came from the Mexican jungle and spread to Asia America to Africa [13,14] in river bank, semi-natural, degraded soil, and secondary vegetation, tea and coffee plantations. This plant is able to survive in rainfall 500 - 3500 mm. This extraordinary ability causes *Leucaena leucocephala* as the most aggressive invasive plant [20]. *Leucaena leucocephala* lives at an altitude of more than 1400m a.s.l. The ability of these plants to adapt and compete in new habitats puts these plants as harmful invasive plants.

Table 2. Distribution of Plants Found along the Mount Panderman Nature Tourism Hiking Track

No	Species	Elevation (m above sea level)	Location
1	<i>Pinus caribaea</i>	2016	7° 54.181'S 112° 29.788'E
2	<i>Chromolaena odorata</i>	2021	7° 54.161'S 112° 29.735'E
3	<i>Lantana camara</i>	1680	7° 53.833'S 112° 29.534'E
4	<i>Leucaena leucocephala</i>	2021	7° 54.045'S 112° 29.626'E
5	<i>Pennisetum purpureum</i>	2017	7° 54.174'S 112° 29.794'E
6	<i>Calliandra calothyrsus</i>	2026	7° 54.155'S 112° 29.870'E
7	<i>Ageratum conyzoides</i>	1593	7° 53.709'S 112° 29.531'E
8	<i>Bidens pilosa</i>	2013	7° 54.155'S 112° 29.838'E
9	<i>Acacia deccurens</i>	2018	7° 54.155'S 112° 29.867'E
10	<i>Anaphalis javanica</i>	1825	7° 54.061'S 112° 29.638'E
11	<i>Gigantochloa apus</i>	1443	7° 53.512'S 112° 29.729'E
12	<i>Cycas rumphii</i>	1435	7° 53.544'S 112° 29.664'E
13	<i>Musa sp.</i>	1430	7° 53.509'S 112° 29.718'E
14	<i>Eucalyptus alba</i>	1837	7° 54.069'S 112° 29.645'E
15	<i>Urena lobata</i>	1810	7° 54.045'S 112° 29.625'E
16	<i>Adiantum capillus-veneris</i>	1429	7° 53.513'S 112° 29.706'E

Pennisetum purpureum is found at an altitude of 2017 m asl *Pennisetum purpureum* comes from tropical forests of Africa and sub-Saharan and has spread throughout the world and naturalized and become invasive species [14, 20]. It is a common weed in agricultural fields, pastures, and along the roadside. These plants also grow in waters, wetlands, floodplains, river banks, swamps, forest edges, disturbed places, and waste disposal sites especially in dry to wet areas [34]. *Pennisetum purpureum* can adapt well to drought conditions and can be found in arid lowlands to lush highlands [35]. The widespread deployment capability of the world by its vegetative and other plants to grow is a factor of this plant is classified as invasive.

Calliandra calothyrsus found at an altitude of 2026m asl *Kaliandra* is one of the leguminous trees that grows and originates in Mexico and Central America in various habitats up to 1860 m altitude from sea level if the phosphate and water requirements for nitrogen fixation are met. Live naturally along the banks of the river, but quickly occupy areas where land is disturbed. This species is especially present in areas where rainfall ranges between 1000 and 4000 mm per year. This species grows in areas with a minimum annual temperature of 18-22°C. In the original growing place, this species lives on various soil types and appears to be resistant to slightly acidic soils with a pH of about 4.5. The spread of invasive *Kaliandra* plant causes stunted growth of native or planted seeds and naturally grown. However its usefulness which is beneficial to society causes prevention of plant spread need to be reviewed again [3,16].

Ageratum conyzoides are found at an altitude of 1593 m asl This species derived from the tropical forests of Latin America and Central to spread to Asia to Africa [13,14,20]. This herbaceous plant is found in tropical and subtropical environments and lives on farmland and plantations, barren land, roads, and forests. *Ageratum Conyzoides* thrive in an environment of organic soil, minerals, with high humidity but difficult to live in less fertile soils [32]. These plants are from South and Central America, *A. conyzoides* include pantropic weed spread to subtropical and temperate regions where it grows in summer [20]. This plant has been recognized as an ornamental plant and cultivation in Europe. Now, however, this species is now found throughout the continent and its spread may be more extensive than is known today [33]. This plant can produce 40,000 seeds per plant and one half of these seeds can germinate shortly after they have broken with lightweight seeds and are easily scattered by wind or carried by water and germinate under various conditions of this environment and grow well up to 3000 m asl [13].

Bidens pilosa is found at an altitude of 2013 m asl This species derived from tropical forests of America and spread to Indonesia to Africa [13, 14,20]. *Bidens Pilosa* is native to tropical America but is now a pantropic weed [29]. Eastern Latin America and Africa have the worst weed infestation of this plant [30]. This plant can usually be seen in all seasons in the tropics but grows most active in the summer and warmer parts. This plant acts as a weed on crops, pastures, vacant lots, gardens, cultivation areas and roadside [31]. It's habitat is usually found

along the river, vegetable fields, rice fields, gardens, roadside, tea gardens, coffee gardens, and rubber plantations. *Bidens pilosa* spread throughout Indonesia except Kalimantan and Maluku [28]. These plants prefer to live wet soil to a height of 2500 m asl [13].

Acacia decurrens are found at an altitude of 2018 m asl *Acacia decurrens* plants are from Australia and can spread all over the world quickly because *A. decurrens* can live easily and have no difficult growing conditions [14,22]. *Acacia decurrens* grow naturally especially in eucalypt forests and Australian forests [26]. In their original distribution timeframe, *Acacia decurrens* is considered a rapidly growing pioneering species and often raises serious concerns because it is potentially invasive to their new habitat [25]. This plant extends about 100 km of depth and natural range of latitudes around 33-37°S [27].

CONCLUSION

Sixteen plants found along the hiking track of Mount Panderman as follows: 5 invasive alien species, 4 potentially invasive alien species, and 8 endemic species. The species of *P. caribaea*, *C. odorata*, *L. camara*, *L. leucocephala*, *P. purpureum* are categorized invasive plants that disrupt the balance and biodiversity due to the nature of the allelopathy belonging to several species to prevent the growth of other species. Four species of plants otherwise potentially invasive include *Calliandra* sp., *A. conyzoides*, *B. pilosa*, and *A. decurrens* because of their ability to survive in harsh environments, and most are the result of successions and cultivars. These invasive/potentially invasive species threaten the growth and distribution of endemic species in the area, i.e *A. javanica*, *G. apus*, *C. rumphii*, *Musa* sp, *E. alba*, *U. lobata*, and *A. capillus-veneris*.

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