



Plant Diversity of the Poaceae Tribe on Teletubbies Hill, Bumiaji Village, Batu City, East Java

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Abstract: Poaceae is an organism that can live and develop, generally found in tropical areas or areas with air temperature with sufficient rainfall to form grasslands. Poaceae have an important role as a barrier to erosion at the foot of the cliff. This study aims to determine the diversity of plants in the Poaceae family. The research was conducted by descriptive observation with observation techniques. The specimen collection method was roaming which was carried out in the Teletubbies Hill area, Bumiaji Village, Batu City, East Java. In collecting specimens, abiotic data were also collected as environmental parameters in the form of rainfall, number of rainy months, average daily temperature, and height above sea level to support the identification process. Based on the observation results, 6 species of the Poaceae family were found. The species found were *Sporobolus indicus*, *Imperata cylindrical*, *Digitaria ciliaris*, *Lepetochloa*, *Bothriochloa ischaemum* and *Eragrostis unioloides*.

Keywords: Biodiversity; Poaceae Diversity; Teletubbies Hill

Introduction

Identification is an activity carried out to determine the identity of plants. the identification process is carried out to determine the correct plant name and to facilitate the grouping of living things (Hartono et al., 2020). This identification is carried out by observing the morphology or characters in plants (Suraya, 2020). Plant identification aims to determine the correct name of a plant and its level based on the classification system (Hildasari & Hayati, 2021).

Poaceae is an organism that can live and develop in all regions (Arisandi et al., 2015). These organisms can grow in tropical and sub-tropical regions (Anggara et al., 2020). Poaceae belongs to the Angiospermae plants (Arisandi et al., 2019). Poaceae are annual plants that have large, hollow, sometimes dense, hairy stems. The leaf bases usually overlap. Poaceae leaves consist of sheath, ligule, and lamina (Peterson et al., 2020).

Poaceae is an easy family to find, and there are a lot of them. In addition, Poaceae also plays a role in human life, with both beneficial and detrimental effects. The beneficial role of Poaceae is that it can be used as food, board, and medicine (Rahman et al., 2022). Poaceae has benefits in everyday life, namely as food, animal feed, handicraft materials, ornamental plants (Hayutiasti et al., 2019). Poaceae is also able to withstand the blows of rainwater and surface runoff so as to prevent erosion. The presence of poaceae can increase soil stability, soil fertility, and land productivity (Widiyanto et al., 2020). In addition, Poaceae is also used as food, boards and can be used as medicine. Poaceae *Chrysopogon zizanioides* can be used as an anti-inflammatory. In addition, the Poaceae type *Sorghum Sachratum* can be used as a malaria drug (Rahman et al., 2022).

Indonesia is one of the hotspots for plant biodiversity in the world (Cahyaningsih et al., 2021). Diversity is the total number of living things at the species, gene and ecosystem levels. Diversity is a trait

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that shows the characteristics of a community where these characteristics are related to the number of species owned and the number of individuals of each species in it. Species diversity is an equality that takes into account the distribution of the number of species originating from each existing species, so that the measurement of diversity will always refer to the number of species or the number of individuals of each species (Hikmah & Dharmono, 2018).

Species diversity (species biodiversity) originates from biodiversity where biodiversity is the diversity of life in various forms, levels of organization, both structure, function and ecological processes that occur at all levels (Mokodompit et al., 2022). The great diversity of many species characterizes a stable community. The more diverse a community, the higher the diversity of organisms in a community. The existence of diversity in the distribution of these species can be influenced by air humidity, temperature, light intensity, soil physico-chemical properties which are certainly a factor in the presence or absence of a species (Rahmawati et al., 2022). The diversity of plant species can be compared or differentiated through their morphological and anatomical structures. There are differences between one plant and another. The less the less diversity of traits shared between species, the higher the similarity, so that the taxonomic affinity is closer. Grouping based on these similarities is a phenetic grouping (Rahman et al., 2022).

Teletubbies Hill is located in Bumiaji, Bumiaji District, Batu City, East Java Province. Teletubbies Hill is located on the slopes of Mount Kelud where this hill was originally used to monitor the volcanic activity of Mount Kelud. Teletubbies hill has an area of 5 hectares with a panoramic view of Mount Arjuna. This hill is called the Teletubbies Hill because it has a wide expanse of grass. Teletubbies hill has a very beautiful view, especially in the evening (sunset) or morning (sunrise) which is suitable for taking photos or making videos, as well as observing the stars at night during the dry season (Ristiawan, 2019). Teletubbies Hill can be reached in approximately 2 hours and 40 minutes from downtown Malang. The charm of the teletubbies hill is very beautiful, but there is still no management from the local community for this.

This study aims to identify the Poaceae tribe, make photographic data of the Poaceae tribe so that it can be used as a supplement to plant diversity. This research was conducted at Teletubbies Hill, Bumiaji Village, Batu City, Malang Regency, East Java.

Method

This research was conducted on Sunday, November 6 2022 at Teletubbies Hill, Bumiaji Village,

Batu City, Malang Regency, East Java. The research was carried out by using descriptive observation with observation techniques, through direct observation in the field for data collection. The specimen collection method used was the cruise method. The cruise method is a method that is carried out by directly following every corner of the location in the area under study (Andini et al., 2020). The population in this study were all species belonging to the Poaceae family found in the Teletubbies hill area. The samples in this study were all species of the Poaceae family found.

The equipment used in this study was writing instruments such as books and pens to record matters relating to research. Apart from that, they also use cellphone cameras to document the plants studied, as well as maps to indicate the location of the plants.

The working procedure for this observation is as follows: (1) Determine the location where there are species of the Poaceae family; (2) Observing the species of the Poaceae family in a predetermined area; (3) Describe the species found in the Poaceae family by filling in the identification table; (4) Describe the data into results and discussion.

In collecting specimens, abiotic data are also collected as environmental parameters to support the identification process. The abiotic data taken are in the form of rainfall, number of rainy months, daily average temperature, and altitude above sea level.

Result and Discussion

The results of observations of plants belonging to the Poaceae tribe on Teletubbies Hill, Bumiaji Village, Batu City, Malang Regency, East Java found 6 species. The complete plant species found are presented in Table 1. The abiotic data as environmental parameters in these areas are presented in Table 2.

Table 1. Identified Plant Data and Their Locations

Name of Species	Location
Sporobolus indicus	(7°51'16"S 112°32'27"E) 1,38 km
Imperata cylindrical	(7°51'15"S 112(°32'27"E) 1,38 km
Digitaria ciliaris	(7°51'17"S 112°32'27"E) 1,38 km
Lepetochloa	(7°51'16"S 112°32'26"E) 1,38 km
Bothriochloa ischaemum	(7°51'16"S 112°32'28"E) 1,38 km
Eragrostis unioloides	(7°51'15"S 112°32'27"E) 1,38 km

Table 2. Abiotic Data

Parameters	Location
Rainfall	220 mm/yr
Number of rainy months	5 month per year
Daily average temperature	20-30 °C
The height above sea level	850-1400 masl

(Wardhani, 2022)

Classification**Figure 1.** *Sprobolus indicus*

Kingdom : Plantae
 Division : Magnoliophyta
 Class : Monicotyledonae
 Order: Poales
 Family : Poaceae
 Genus: Sporabolus
 Species : Sprobolus indicus

Description: *Sprobolus indicus* is a type of plant that belongs to the grass. Growing wild in humid places with a temperate climate, this grass has a tuft of stems about one meter high or the equivalent of 3 feet, round in shape, has small cavities and is green to brown in color (Anwar, 2020). It has brown fibrous roots. The leaves are thin creeping with a length of less than 15 cm. There are seeds consisting of various white to pale green grains.

Uses: This grass has medicinal benefits and is mostly used to promote healthy skin, hair and bones (Bauer, 2023). The first benefit is supporting bone health. Case studies show that this grass can inhibit osteoclasts and stimulate osteoblasts. In addition, it can also be used for wound healing. Not only that, this grass can be used to help hair growth. Studies show that the presence of antioxidants helps reduce micro-inflammation and aging of the hair fiber caused by free radicals. Second, the higher silica content in the hair fiber results in a lower rate of hair loss, as well as increased brightness.

Distribution: *Sprobolus Indicus* is a species of grass native to the tropical and temperate regions of the Americas. This plant is a plant that grows in almost all parts of the world. Generally, this flora group lives in a humid environment.

Classification**Figure 2.** *Imperata cylindrica*

Kingdom : Plantae
 Division : Eukaryota
 Class : Monocotyledonae
 Order: Poales
 Family : Poaceae
 Genus: Imperata
 Species : I. cylindrica

Imperata cylindrica or commonly called alang-alang which is a type of grass that grows and spreads to all parts of the earth. This type of grass is often considered an agricultural weed (Sulistiyowati, 2022). *Imperata* is a plant native to tropical and subtropical Asia, Micronesia, Melanesia, Australia, Africa, and southern Europe. This plant is a highly flammable pyrophyte, and can spread rapidly by colonizing disturbed areas and triggering more forest fires. frequent. Grows from 0.6 to 3 m (2 to 10 ft). The leaves are about 2 cm wide near the base of the plant and narrow to a sharp point at the top with finely toothed margins. The upper surface is hairy near the base of the plant while the lower part is usually hairless. It has an extensive rhizome network, its biomass reaching 60% of the total plant biomass.

Uses: The use of this plant is that it can be used for making paper, straw, and weaving. It is usually planted near beaches or areas affected by erosion. In addition, it is commonly used for traditional Chinese medicine and the flowers and shoots can be used for cooking because the roots contain starch and sugar so they are easy to chew.

Distribution: *Imperata cylindrica* was first described by Linnaeus in 1759 under the basionym *Lagurus cylindricus*. They were renamed by the French entomologist and botanist Palisot de Beauvois to the currently accepted name *Imperata cylindrica*. *Imperata cylindrica* is native to tropical and subtropical Asia, Micronesia, Melanesia, Australia, Africa and southern Europe.

Classification



Figure 3. *Leptochloa chinensis* (L.) Nees

Kingdom : Plantae
 Subkingdom : Tracheobionta
 Superdivision: Spermatophyta
 Division : Magnoliophyta
 Class : Liliopsida
 Order: Poales
 Family : Poaceae
 Genus: *Leptochloa*
 Species : *Leptochloa chinensis* (L.) Nees

Description : *Leptochloa chinensis* (L.) Nees has fibrous roots with a brown color. This grass has a hollow cylindrical stem with a smooth green surface. In addition, this grass has a leaf shape with a pointed tip and a leaf surface like paper. This species has a slender, tufted, upright body with a height of 10-20 cm per year. *Leptochloa* has fibrous, hollow, smooth, and leafy roots. The leaves are in the form of loose sheaths with a length of 4-10 cm (Hikmah & Dharmono, 2018).

Uses: *Leptochloa chinensis* (L.) Nees is used as animal feed. Distribution: *Leptochloa chinensis* (L.) Nees from Southeast Africa from Kenya to South Africa, while in Asia from India and Sri Lanka heading to Southeast Asia including to Indonesia.

Classification



Figure 4. *Ciliary digitaria*

Kingdom : Plantae

Division : Magnoliophyta
 Class : Liliopsida
 Order: Poales
 Family : Poaceae
 Genus: *Digitaria*
 Species : *Digitaria ciliaris*
 (Koehuan et al., 2018)

Description: *Digitaria ciliaris* is referred to as a weed that is able to adapt well to dry and hot environments, so this grass is classified as a C4 plant (Simangunsong et al., 2018). This plant lives in clumps with a creeping base, has a height of up to 1-1.2 m, segments 3-4 cm. The stem is flat, which is increasingly hollow, hollow green. The leaves are in the form of lines with rough edges that are purplish in color and have child grains that alternate left and right of the shaft. In addition, the leaves of this grass stand alone and in pairs, but the length of the stalks is not the same with a length of about 2-4 mm (Ilham, 2014). The flowers are in the form of finger compound grains, in pairs, and lanceolate (Koehuan et al., 2018).

Uses: *Digitaria ciliaris* is largely considered an agricultural weed. However, *Digitaria ciliaris* has active bioactivity that is able to regenerate skin and wound healing by inducing proliferation, migration, fibroblast collagen synthesis, and keratinocyte proliferation (Park et al., 2020).

Distribution: *Digitaria ciliaris* originates from Europe and is now widely distributed to all continents, except Antarctica. *Digitaria Ciliaris* lives in rough and disturbed areas. For example in fields, grasslands, roadsides, railroads, and waste construction sites (Jones et al., 2021).

Classification



Figure 5. *Bothriochloa ischaemum*

Kingdom : Plantae
 Subkingdom : Tracheobionta
 Superdivision: Spermatophyta
 Division : Magnoliophyta
 Class : Liliopsida
 Order: Poales

Family : Poaceae
 Genus: Bothriochloa
 Species : Bothriochloa ischaemum

Description: Bothriochloa ischaemum is a type of plant that can live in warm climate zones, can reproduce quickly, can survive drought and also has strong regenerative abilities, so it is included in the class of perennial grasses. Bothriochloa ischaemum is an important species for the restoration of grassland degradation so that it can survive drought (Liu et al., 2021). Bothriochloa ischaemum belongs to a grass species that has a fibrous root system, its leaves have a length ranging from 30-80 cm. This plant is usually in the form of tufts, sometimes in the root hairs there are stolons which are located around the rhizomes that spread below the soil surface. The stem is slender with an upright line, simple or few branches, solid, light green in color but when mature can turn yellowish. The leaves are slightly grayish in color, with veins that are shaped like straight blades. The average leaf has a length ranging from 5-25 cm with a width of 2-4.5 mm with thin hairs scattered on the upper surface of the leaf. The flowers are purple with a criss-cross position and have 2-10 clusters where each cluster is 2.5-9 cm long. The leaf bones of this plant have fine cilia. Uses: Bothriochloa ischaemum is usually used as animal feed. Distribution: Bothriochloa ischaemum is native to Europe, Asia and Africa.

Classification



Figure 6. Eragrostis unioloides

Kingdom : Plantae
 Subkingdom : Tracheobionta
 Superdivision: Spermatophyta
 Division : Magnoliophyta
 Class : Liliopsida
 Order: Poales
 Family : Poaceae
 Genus: Eragrostis
 Species : Eragrostis unioloides

Description: Eragrostis unioloides has other scientific names Eragrotis euchroa Steund, Eragrotis formonasa Hayata, Poa rubens Lam, and Poa unioloides Retz (Duenas-Lopez, 2022). In Indonesia this type of grass has local names emprit-emprit and jukut piit (Nuhaa et al., 2019). Eragrostis unioloides is a type of annual grass, generally 0.1–0.6 meters high with round cylindrical stems. Its stature is in the form of a plant with soft stems because it is not woody or it is called terna. The leaves are parallel, the leaf sheath is hairy, and the ligules are short. The flower branches are getting shorter and forming an angle. This type of grass reproduces vegetatively using seeds, as grass flowers are adapted for wind pollination. Eragrostis unioloides lives in large groups. This type of grass grows well in dry and humid habitats, is found in many plantation areas, rice fields, roadsides and footpaths (Duenas-Lopez, 2022). Uses: Eragrostis unioloides is usually used as animal feed. Distribution: Eragrostis unioloides is found on the Asian continent

Conclusion

Identification of plant diversity of the Poaceae tribe on Teletubbies Hill located in Bumiaji Batu Village. This research was carried out using descriptive observation using observation techniques through direct observation in the field for data collection. The sampling method used the specimen method, namely free roaming which was carried out in the Teletubbies Hill area. In this study, the results obtained were 1 grass family, namely Poaceae. Poaceae is an organism that can live and develop in all regions. This Poaceae has a variety of types. From our observations we found 6 species namely sporobulus indicus, imperata cylindrical, digitaria ciliaris, lepetochloa, bothriochloa ischaemum, eragrotis unioloides. Poaceae have an important role as a barrier to erosion at the foot of the cliff. In addition, poaceae leaves also function as erosion prevention when it rains. The existence of grass paths can also hold mud and sediment carried by water, because a grass path has the property of binding the soil so that it can form stable terracing. This plant, generally found in tropical areas or areas with air temperature with sufficient rainfall to form grasslands.

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From the above discussion to obtain information about poaceae which have various benefits, both from a general and ecological point of view, it is necessary to carry out research on identifying poaceae in order to find out the species name and its description, and to know that poaceae has a variety of extraordinary benefits.

Author Contributions

Conceptualization, R.P and S.U.N.; methodology, S.R.F.; software, S.U.N.; formal analysis, A.D.K.A., L.S., R.P., S.U.N., and S.R.F.; investigations, A.D.K.A., L.S., R.P., S.U.N., and S.R.F.; resources, A.D.K.A., L.S., R.P., S.U.N., and S.R.F.; data curation, A.D.K.A., L.S., R.P., S.U.N., and S.R.F.; wrote preparatory original drafts, A.D.K.A., L.S., R.P., S.U.N., and S.R.F.; writing reviews and editing, S.R.F and R.P., supervision, I.F. All authors have read and agree to the published version of the manuscript.

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Conflicts of Interest

This research has no significant conflict of interest.

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