E-ISSN: 2798-0472 DOI: 10.52562/biochephy.v5i2.1835

BIOCHEPHY: Journal of Science Education

http://journal.moripublishing.com/index.php/biochephy

MORPHOLOGICAL IDENTIFICATION OF ANGIOSPERM FLOWERS AS A LEARNING RESOURCE REFERENCE FOR THE COURSE ON PLANT DEVELOPMENT STRUCTURE

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Abstract: Angiosperm flowers at Bakti Indonesia University are diverse, and their use as learning resources is not yet optimal. The purpose of this study was to determine the diversity of angiosperm flowers at Bakti Indonesia University and their morphological structure. The type of research is descriptive qualitative with exploratory methods and descriptive data analysis approaches. Data collection techniques used documentation and then identified the morphological structure. The research location is Bakti Indonesia University. The results of the study found 7 families of angiosperm flowers, including the Rubiaceae family, the Euphorbiaceae family, the Nyctaginaceae family, the Acanthaceae family, the Caricaceae family, the Apocynaceae family, and the Solanaceae family. The conclusion of the results of this flower diversity can be used as a learning resource for students.

Keywords: Angiosperm Flowers, Learning Resource, Morphological

Abstrak: *Bunga angiospermae di Universitas Bakti Indonesia beragam dan pemanfaatannya sebagai sumber belajar belum optimal. Tujuan penelitian untuk mengetahui keanekaragaman bunga angiospermae di Universitas Bakti Indonesia dan struktur morfologinya. Jenis penelitian yaitu kualitatif deskriptif dengan metode eksploratif dan pendekatan analisis data deskriptif. Teknik pengumpulan data dengan dokumentasi kemudian diidentifikasi struktur morfologinya. Lokasi penelitian di Universitas Bakti Indonesia. Hasil penelitian ditemukan 7 famili bunga angiospermae meliputi famili Rubiaceae, famili Euphorbiaceae, famili Nyctaginaceae, famili Acanthaceae, famili Caricaceae, famili Apocynaceae, dan famili Solanaceae. Simpulan hasil keanekaragaman bunga ini dapat digunakan sebagai sumber belajar bagi pelajar.*

Kata Kunci: *Bunga Angiospermae, Sumber Belajar, Morfologi*

INTRODUCTION

The Bakti Indonesia University campus boasts a rich diversity of flowering plants, particularly angiosperms. These plants grow in various areas of the campus, including the front yard, backyard, field, and student dormitory. The growth of these diverse flower species can be used as direct identification objects in courses on plant developmental structures, particularly in the study of plant morphology. The biological resources found in this environment can be utilized as learning materials and media (Kundariati & Izza, 2021; Lamasai et al., 2017). Environmentally based learning is now receiving a lot of attention in science learning because it can help improve students' conceptual understanding and practical skills (Abdullah, 2024). However, regarding this matter, the diversity of Angiospermae flowers and their morphology has not been documented until now; this hinders the optimal utilization of the surrounding environment for learning.

Learning with the use of the surrounding environment will make it easier for students to understand the material learned. This is because students can see and come into direct contact with

the objects observed. Experiential learning can help improve learning activities and directly let students know real examples related to the concepts learned (Abdullah, 2024; Aithal & Mishra, 2024). This environment-based learning refers to the theory of learning constructivism. In line with the theory of constructivist learning by J. Burner, which states that learners can recognize the surrounding environment through the social processes of their world so as to form new knowledge through previous knowledge (Stapleton & Stefaniak, 2019). Learning that involves the surrounding environment will create an immersive learning experience for learners (Riastuti et al., 2025; Zahrah et al., 2024). Thus, learning by utilizing the surrounding environment will give a meaningful impression to students.

In practice, learning in plant structure and development courses still tends to use references from textbooks or picture illustrations. This often results in students being constrained to understand and having difficulty applying the theories learned with practice. Especially in learning plant morphology, which is important material in biology that advises students to know the shape and structure of plants (GH et al., 2025). In the plant morphology material, students study plant parts, which include leaves, roots, stems, flowers, seeds, and fruits. In line with this research, which focuses on the morphological structure of flowers. According to the research of Sulisetijono et al., (2023) the topic of flower morphological structure is the main material in learning about the structure of plant development. Therefore, there is a need for research that helps to support learning resources in plant development structural courses.

According to the research of Sulisetijono et al. (2023), in this research study, we will focus on the morphology of angiosperm flowers, which play an important part in plant learning. Based on research related to angiosperms, they are plants that have the most, around 90%, followed by moss at 4%, ferns at 3%, and liverwort at 2% (Ferrer et al., 2023). Angiosperm plants can produce a variety of flowers (Sugiyama et al., 2019). Flowers are reproductive organs that have an important role in the process of plant reproduction (Pabón-Mora et al., 2022). Flowers are one of the important organs that are the basis for identification, classification, and learning in plant evolution. This study is important to be carried out as an understanding that will be the main aspect in the study of plant taxonomy and anatomy for academics, students, and researchers in the field of plants

Previous research related to flower morphology in the campus environment or learning environment has been carried out a lot, including research in the area of the Faculty of Tarbiyah and Teacher Training of the State Islamic University of Sunan Kalijaga as a learning resource for students who research the morphology of angiosperm flowers, which obtained 8 species (Wulandari & Chabib, 2024). Other research was also conducted in the campus area of the State University of Medan, finding 80 species classified into 71 genera and 33 families and consisting of monocot and dicot groups (Marpaung et al., 2024). Several studies have utilized plants in the learning environment as a learning resource.

In this study, research will be carried out around the environment around the campus of Universitas Bakti Indonesia as a form of utilizing local potential as a learning resource. This research was carried out with the aim of identifying the morphology of angiosperm flowers as a reference for learning resources for the plant development structure course. The results of the identification of this study are expected to be used as contextual teaching materials that support the learning process and student competence in terms of observation and analysis in the plant development structure course.

METHOD

This research is a type of qualitative research. Qualitative research is research that views problems as phenomena that have many dimensions and meanings, so that qualitative research tries to display them in various ways. The method used in this study is in the form of an exploratory descriptive method by exploring and studying the literature (Leedy & Ormrod, 2021). The data obtained was then analyzed using descriptive analysis to identify the species of the flowers obtained and then identify the morphology. The identification of the plants obtained was done by

comparing the results of the documentation with the literature images. This research uses tools and materials including notebooks, mobile phones, loops, cameras, and pens. This research was conducted from August to September 2025. The data collection method uses direct imaging techniques. The data collection site was carried out in the area of Universitas Bakti Indonesia.

RESULT AND DISCUSSION

The research process identified several species of angiosperm flowers on the Bakti Indonesia University campus that can serve as learning resources. The following data on several angiosperm flower species are listed in Table 1.

Table 1. Several species of Angiospermae flowers at Bakti University Indonesia

No.	Nama Lokal	Nama ilmiah	Genus	Famili
1.	Kembang Soka Abang	*Ixora javanica*	Ixora	Rubiaceae
2.	Kembang Soka Kuning	*Ixora chinesis*	Ixora	Rubiaceae
3.	Kembang Brunai	*Euphorbia milii*	Euphorbia	Euphorbiaceae
4.	Kembang Kertas Abang Nom	*Bougainvillea spectabilis*	Bougainvillea	Nyctaginaceae
5.	Melati Jepang	*Pseuderanthemum reticulatu*	Pseuderanthemum	Acanthaceae
6.	Jenthit	*Carica papaya L*	Carica	Caricaceae
7.	Kembang Kambojo Abang	*Adenium obesum*	Adenium	Apocynaceae
8.	Kembang Kambojo Kuning	*Plumeria alba*	Plumeria	Apocynaceae
9.	Menik	*Capsicum frutescens L*	Capsicum	Solanaceae

Closed seed plants have different flower characteristics from open-seeded plants. Reproductive organs in closed seed plants are the development of flower buds to flower organs. Based on their position, the angiosperm flowers are at the tips of the stems or branches and in the armpits of the leaves. Some of the flowers are one (planta uniflora) and many flowers (planta multiflora) (Pujawati & Damaris Payung, 2022). The following are the results of research on angiosperm flowers from several species in the area of Universitas Bakti Indonesia.

1. *Ixora sp.*

In this study, two species of asoka flowers were found, namely red and yellow asoka flowers. Asoka flowers with these color differences have similarities in genus but differ in species. The red asoka flower has the scientific name *Ixora javanica*, while the yellow asoka flower has the scientific name *Ixora chinesis*. The asoka flower, with the local name "Soka Flower," is a flower from the Rubiaceae family. Compound flower type with umbrella shape. The color of the crown varies from red, orange, yellow, or pink. The morphology of the Asoka flower is a two-sex flower; the petals are funnel-shaped and have four stamens that are 0.5 cm long, the anthers are attached to the crown, and the color of the flowers is red (Saidah et al., 2024). The following is the appearance of the *Asoka Flower* documentation.

Figure 1. Ixora javanica

Figure 2. Ixora chinesis

The Asoka flower *Ixora javanica* is commonly named for use as an ornamental plant. In addition to being used as an ornamental plant, this plant also has the benefit of being able to be used as aromatherapy because it has a fragrance like lyanga flowers (Wati et al., 2025).

2. *Euphorbia milii*

Euphorbia milii, which has the local name of the Brunei Flower, is a type of flower from the Euphorbiaceae family, or sap. It is an infinite compound flower consisting of a series or umbrella of flowers. Each flower is filled with 4 to 32 florets. This flower looks striking because it has a modified leaf called a bract. Bracts (protective leaves) and colorful flower petals are red, simple red, yellow, and orange. There are male flowers and female flowers located in the cyathium. The characteristics that this family has in general are that it resembles milk and has single-sex flowers (Akira et al., 2024). The following is the appearance of the documentation of *Euphorbia milii.*

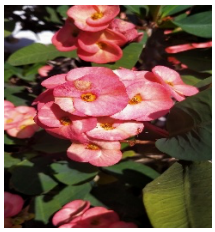

Figure 3. Euphorbia milii

Euphorbia milii is a flower of an ornamental plant that is commonly grown in pots. Apart from being a flower decoration, *Euphorbia milii* has several benefits, namely treating hepatitis A disease, which attacks the liver organs and is caused by viral infections. The flowers of this plant can also treat burns and relieve uterine bleeding by boiling (Gunawan et al., 2023).

3. *Bougainvillea spectabilis*

Bougainvillea spectabilis, also known as paper flowers, has many attractive bract variations. Varieties include pink, purple, red, orange, and white. The paper flower found at Bakti Indonesia University is pink. This flower is incomplete and consists of a perianth, stamens, and pistil. Below is a documentary depicting *Bougainvillea spectabilis.*

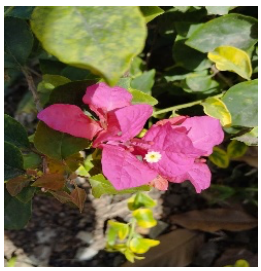

Figure 4. Bougainvillea spectabilis

Bougainvillea spectabilis has many uses. It is used as an ornamental plant, in aromatherapy, and as a traditional medicine for treating coughs and sore throats, reducing fever, and maintaining cholesterol and blood pressure (Syam et al., 2023). Apart from that, the *Bougainvillea spectabilis* flower plant has ecological benefits, namely being able to absorb heavy metals such as lead (Pb) in the environment (Azizah & Utami, 2021).

4. *Pseuderanthemum reticulatum*

Pseuderanthemum reticulatum, also called Japanese Jasmine, has a predominantly white flower color and has pink or purple spots in the middle. The shape of the flower crown is like a tube that opens at the end. This flower has five lobes that are not the same length and has five petals that measure about 3 mm to 5 mm. The stamens are erect and held at the bottom of the upper lip of the crown and have two stamens. The following is the appearance of the documentation *Pseuderanthemum reticulatum.*

Figure 5. Pseuderanthemum reticulatum

Japanese jasmine flowers are common in plants to be used as ornamental plants, and another benefit is that this plant is one of the plants that can be used to reduce pollution due to air pollution (Fascavitri et al., 2018). In addition to having beautiful flowers, this plant also has many other benefits. This is also supported by previous research conducted by Anisa et al., (2015) stated that the *Pseuderanthemum reticulatum* plant has a moderate ability to absorb air pollution such as lead (Pb). Therefore, people often plant these plants in front of their homes and on the side of the road because they have benefits for the environment.

5. *Carica papaya l*

Carica papaya L This papaya flower is often called "Jenthit". The flowers are white with a trumpet-like or oval shape. Located in the armpits of the leaves. This flower has five petals with a yellowish-white color. Male flowers have stalks that are panicle-shaped, and female flowers and perfect flowers have shorter stalks. This papaya plant has three types of flowers, namely male flowers, female flowers, and perfect flowers. The following is a documentation of papaya flowers.

Figure 6. Carica papaya l

Papaya flowers have several properties, including being able to treat fever, cough, and various other diseases. Based on studies that have been conducted, papaya flowers contain bioactive compounds, including phenolics, flavonoids, tannins, saponins, terpenoids, and glycosides in various solvents (Chandra et al., 2022). Therefore, people can use papaya flowers as a source of food and medicine for health.

6. *Adenium obesum*

Adenium obesum is a Japanese nickname. The flowers are trumpet-shaped, with red color easily on the edges, the white center is slightly faded, and the middle is yellow, and the base of the flower is tubular. Flower stalks emerge from the armpits of the leaves. It consists of 5 small petals with an elongated narrow green color. The pollen is yellow. Pistils consist of two carpels that are fused, a slender white stalk with a white head in the middle of the flower tube. Japanese frangipani flowers include hermaphrodite single flowers, which have stamens and pistils. Cambodian flowers include compound flowers (Diharjo & Nurmiyati, 2024)

Figure 7. Adenium obesum

Adenium obesum is a popular ornamental plant that can be planted in front of the house to enhance the beauty of the yard. Furthermore, *Adenium obesum* contains antioxidants and anticancer and anti-inflammatory properties that can be used to treat cancer, lung disease, and inflammation (Alshehri et al., 2022).

7. *Plumeria alba*

Plumeria alba with the local name White Kamboja. This flower has a white color with a yellow middle part and a fragrant scent. The number of five petals with a wide shape forms a trumpet-like structure. This flower has different characteristics from other Kamboja flowers, namely having a flower crown that is entirely yellow and lanceolate leaves with the base of the leaf tips tapered (Diharjo & Nurmiyati, 2024). The following is the appearance of the white Kamboja flower documentation.

Figure 8. Plumeria alba

White Kamboja plants are usually used by the community as ornamental plants in the yards of their homes. In addition to having aesthetic benefits, this plant has benefits as a mosquito repellent aromatherapy (Nurcahyo & Purgiyanti, 2017) and antibacterial (Jiwantono et al., 2017).

8. *Capsicum frutescens l*

Capsicum frutescens L., chili flower, is commonly called "Menik". The flowers are white with a greenish crown. The flower structure is a complete flower with a petal, flower crown, stamens, and pistils. The shape resembles a trumpet. The following is the appearance of *Capsicum frutescens L.* documentation.

Figure 9. Capsicum frutescens l

Capsicum frutescens L. plant is usually used for its fruit as a spice for cooking because of its spicy taste. This plant is usually grown in the yard or cultivated in the garden. The benefits of *Capsicum frutescens L.* flowers are still unknown to date.

The plants that grow around the campus environment are mostly angiosperm plants. Based on previous research, it is also stated that flowering plants (angiosperms) make up the largest number, about 90%, of all land plants that exist today. Since ancient times in the Mesozoic period, angiosperm flowers have undergone significant evolution and have ecological dominance in almost all terrestrial ecosystems (Zuntini et al., 2024). Flowering plants found around the environment are very useful to use as a learning resource. Learning resources taken from the surrounding environment will be able to make it easier for students to apply the theories and concepts learned with practice. This activity is in accordance with the theory of constructivism; namely, by learning, students will build their knowledge through the surrounding environment in a more meaningful way (Daryanes et al., 2025; Wulandari & Chabib, 2024). Therefore, it is important to always take advantage of the surrounding environment in every learning related to it, especially in biology courses.

Learning activities by utilizing the surrounding environment in the plant development structure course make the material studied no longer abstract but more real and can be identified directly. Students can find out and observe the object of learning plant morphology, which includes the characteristics of flowers in terms of inflorescence type, flower completeness, sexual organs of flowers, and modifications of flower parts (Wulandari & Chabib, 2024). Thus, the plant development structure course learning activities feel more meaningful and deep.

CONCLUSION

Based on the results of the analysis and discussion that have been described, it can be concluded that in this study, flowers with 7 families and 8 different genera were found. Some of the species found include *Ixora javanica* and *Ixora chinesis* from the Rubiaceae family, *Euphorbia milii* from the Euphorbiaceae family, *Bougainvillea spectabilis* from the Nyctaginaceae family, *Pseuderanthemum reticulatum* from the Acanthaceae family, *Carica papaya l* from the Caricaceae family, *Adenium obesum* from the Apocynaceae family, *Plumeria alba* from the Apocynaceae family, and *Capsicum frutescens l* from the Solanaceae family. The diversity of flowers in this learning environment can support learning, especially in the course of plant development structure, because it can be used to enrich learning resources in the morphology section, especially flower organs in plants.

ACKNOWLEDGEMNET

The researcher expresses gratitude to the rector of Bakti Indonesia University for allowing them to conduct research and collect data within the campus of Bakti Indonesia University. Thanks also go to the fellow members of the research team who contributed and always provided encouragement in carrying out the research, so that this study could be completed successfully.

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