The Golden Ratio On Flowers As A Tourist Attraction In Malang,Indonesia

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Abstract:
Background :Flowers are an object that has aesthetic value or beauty. The attraction of flowers is closely related to tourism. Flowers can attract tourists to enjoy their beauty. The assessment of beauty can be measured by the number of people who possess beauty using the golden ratio. This research aims to determine the location of the beauty of the golden ratio in flowers in the Malang area. The beauty of the flowers that grow in each location can create an attraction that can be useful for interpretation in ecotourism. This can be an encouragement to support tourism planning so that it can achieve high beauty.
Materials and Methods : Research was carried out at all locations where flowers grow in the Malang area. Research includes initial surveys, data collection, data processing, and writing a thesis. The research was carried out in September–October 2023. This type of exploratory research aims to find out the location of the golden ratio in 134 flowers in the Malang area by observing, measuring, and documenting. The data analysis used is the golden ratio, which produces a number of 1.618 or close to that number. Adobe Photoshop to get more accurate golden ratio resultsand ImageJ to get results in the form of area comparisons.
Results : The research results show that Nineteen family flowers have been reported to be growing in the Malang region. The family with the greatest number of species discovered is Orchidaceae. In Malang, orchids belonging to the Orchidaceae family are frequently encountered. These include Vanda, Cattleya, Phalaenopsis, and Dendrobium. All the flowers studied contain a golden ratio number, namely 1.618, or a number close to the golden ratio in the range of 1.610–1.650. The difference in the numbers obtained from the interest is because the golden ratio number, which has a value of 1.618, has 3 digits after the comma, whereas the research measuring instrument only reaches one digit after the comma. Weaknesses in this tool mean that the value obtained is only close to 1.618. Various tourist attractions based on flower plants have been developed in Malang with various unique characteristics for visualizingthe beauty of flowers.
Conclusion : The results of the analysis show that all flowers in the Malang area meet the golden ratio criteria. The golden ratio is most often found in the ratio between the length and width of the petals of each flower. Flowers as a tourist attraction in Malang have developed and grown with various uses.
Key Word:.Attractiveness, Ecotourism interpretation, Flowers, Golden ratio

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I.   Introduction

Flowers are an object that has aesthetic value or beauty. Evidence that flowers have beauty was presented by Hula and Flegr (2016) in their research, showing that there are many apartment and garden owners planting flowers, horticulturists are trying hard to breed new types of decorative flowers, and floral motifs are often found in paintings, fabrics, porcelain, or jewelry. Flowers also have positive emotional impacts on humans, such as increasing happinessand strengthening social relationships (Jones 2018).

The attraction of flowers is closely related to tourism. Flowers can attract tourists to enjoy their beauty. According to Karimah and Hastuti (2019), tourist attractions are the main drivers that motivate tourists to visit a place. According to Puspa (2019), a tourist attraction is a tourist attraction that can take the form of a natural appearance or beauty.

The golden ratio is often identified with beauty in nature. This connection between the golden ratio and beauty then gave rise to many works of art created with reference to the golden ratio (Maria and Wilfridus, 2022). The golden ratio is a ratio often encountered in nature, describing balance. The golden ratio is not only discussed in the world of mathematics but also in various scientific disciplines such as biology, history, psychology, and various other scientificdisciplines.

Beauty can be measured by a number that is believed to have beauty using the golden ratio. This ratio is believed to be the divine ratio or golden number (Kissinger 2012; Sharif 2014). Several studies have been conducted to determine human preferences for the beauty of flowers compared to other parts of plants. A study shows that the colors of flowers and leaves are more attractive to respondents than the colors of stems or other parts (Rifai et al. 2014).

This research aims to determine the location of the beauty of the golden ratio in flowers in the Malang area. The beauty of the flowers that grow in each location can create an attraction that can be useful for interpretation in ecotourism. This can be an encouragement to support tourism planning so that it can achieve high beauty and disseminate information about flowers.

II.   Material And Methods

This research was carried out at all locations where flowers grow in the Malang area. Research includes initial surveys, data collection, data processing, and writing a thesis. The research was carried out in September–October 2023. Data collection includes primary data and secondary data. Secondary data was obtained from literature studies regarding flowers that grow at the research location, including taxonomy as determining flower categories based on family. Primary data collection includes flower morphology measurements and flower documentation. This type of exploratory research aims to find out about the location of the golden ratio in 134 flowers in Malang by observing, measuring, and documenting. A quantitative approach is used to measure and analyze in order to obtain a comparison that produces the golden ratio value of interest. Flower morphology was measured using the tools used, namely a caliper to measure flower morphology and a camera to obtain documentation of the flowers studied.

Procedure methodology

By watching, measuring, and recording flowers at the research area, this sort of exploratory research seeks to determine where the golden ratio is found in flowers blooming in Malang. To determine the golden ratio value of flowers in Malang, a quantitative method of measurement and analysis is employed. Purposive sampling was used to gather samples, and distinct flower type criteria were used from earlier studies conducted in Bogor, Cianjur, and Sukabumi, Indonesia.

Digital representations of the collected data make it easier to analyze golden ratio proportions. The golden ratio calculation is done by finding or looking at the morphology of each flower. Analysis may be performed by comparing the flower's length to the stem, the flower's length and breadth in the flower crown, the length of the flower as a whole and the height of one crown, and other comparisons by first examining the flower's morphology. The documentation results obtained from the object under study will then be calculated using the golden ratio formula.

$$\frac{a}{b} = \frac{a+b}{a} = 1.618... = \varphi$$

Figure 1. Formula To Find Out The Golden Ratio

Interest is considered to contain the golden ratio, namely if the height, length, width, and area of the object will produce numbers that are close to 1.618 and 0.618. If the numbers obtained are far from 1.618 and 0.618, then it can be said that the interest that has been measured contains the golden ratio.

These measurements are then processed using the Adobe Photoshop application to visualize the size and location of the golden ratio of the flower. The tool used in the Adobe Photoshop application is the line tool to create lines from measurement results in the field. After using the line tool, the line-forming tool is used to create a comparison line to determine the presence of the golden ratio in the flowers that have been measured. Then use the ImageJ application to get results in the form of a comparison of the area of the flower.
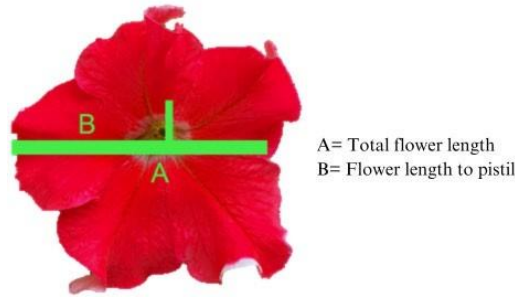
Flowers Findings in Malang
Figure 2. Example Of Golden Ratio Data Analysis Results

A= Total flower length
B= Flower length to pistil

III.   Result and Discussion

Outcomes Nineteen family have been reported to be growing in the Malang region. In this survey, the family with the greatest number of species discovered is Orchidaceae. In Malang, orchids belonging to the Orchidaceae family are frequently encountered. These include Vanda, Cattleya, Phalaenopsis, and Dendrobium. Flowers from the Orchidaceae family are commonly found in the Malang region due to the favorable temperature and natural surroundings. Malang's temperate environment, which includes significant rainfall and a broad range of elevations, isperfect for orchid growth.
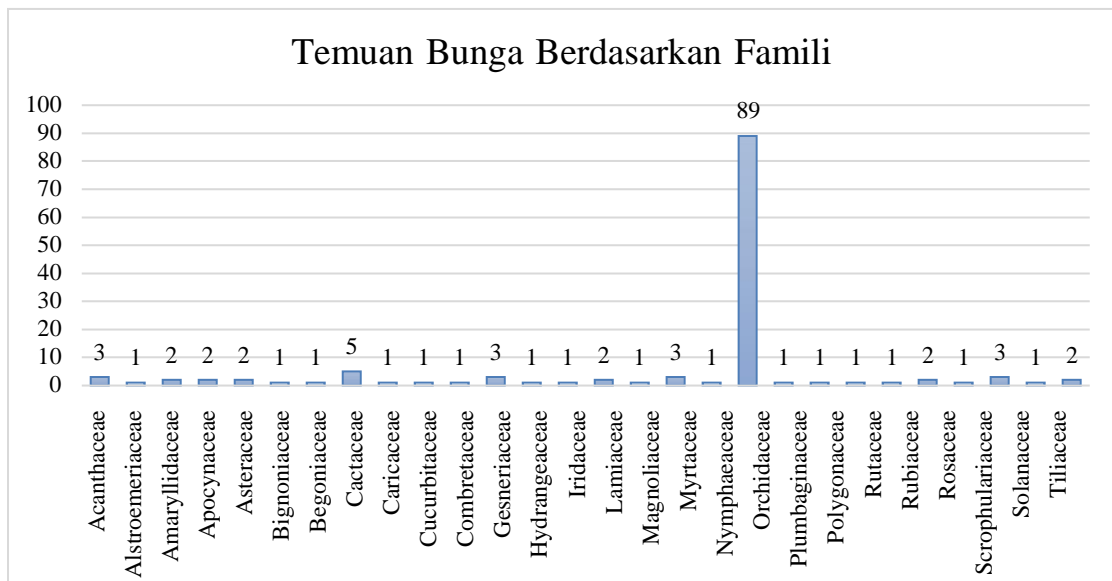

Figure 3. Flower Findings By Family

Flowers are one of the horticultural products created in Malang Raya, as decorative plants, according to the results of primary and secondary data. The resultant effects of stakeholders' particular attention to flowers in Malang include enhancing it as a tourist destination, fostering a beautiful and healthy environment, maximizing farmers' welfare, and expanding commercial prospects. The demand for high-value flowers like as orchids, anthuriums, adeniums, roses, chrysanthemums, gerberas, and carnations is quite strong in Malang, which is driving the growth of decorative plant commodities. Businesses like lodging facilities, workplaces, florists, caterers, and other service providers are examples of routine market demand. In Malang, farmers using intermediate technologies already do the majority of the intensive flower development. Malang's decorative plant industry is supported by the existence of organizations or groups that work in the field of flora, such as cooperatives, associations, or foundations. Aside from that, initiatives to market flowers as a commodity are consistent with Malang's natural resource potential and consideration of aesthetics, comfort, and environmental sustainability.

Golden Ratio on Flowers

The research results show that all the flowers studied contain a golden ratio number, namely 1.618, or a number close to the golden ratio in the range of 1.610–1.650. The difference in the numbers obtained from the interest is because the golden ratio number, which has a value of 1.618, has 3 digits after the comma, whereas

the research measuring instrument only reaches one digit after the comma. Weaknesses in this tool mean that the value obtained isonly close to 1.618.

The Orchidaceae family found in Malang has a diverse morphology, resulting in variations in the location of the golden ratio in each species. The golden ratio has been used to analyze the proportions of natural objects, for example, flower petals (Ghorbani, 2019). Some flowers that have a golden ratio in the ratio between length and width of petals are Phalaenopsis amabilis with a ratio of 50.7mm/31.1mm, which produces a value of 1.619; Rhyncattleanthe nell hammer with a ratio of 43mm/26.6mm, which produces a value of 1.617; and Cattlianthe sound tone red. with a ratio of 39.5 mm/24.2 mm and a result of 1.618.
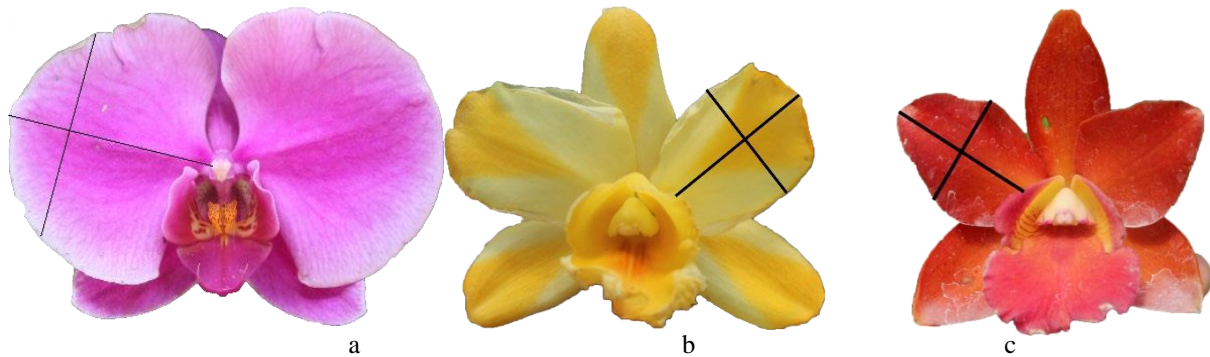

a   b   c

Figure 4. *Golden ratio on crown (a)Phalaenopsis amabilis, (b)Rhyncattleanthe nell hammer, and (c) Cattliantheloog tone red*

The next golden ratio is found in the ratio between the height and width of the pattern on one of the petals. The golden ratio in this position is found in the flowers of Dendrobium wulaiense, Catelea violacea semi alba, and Rhyncattleanthe thongsuphan gold. For these three flowers, it was found that the ratio between the height and width of the pattern produced a number of 1.618.
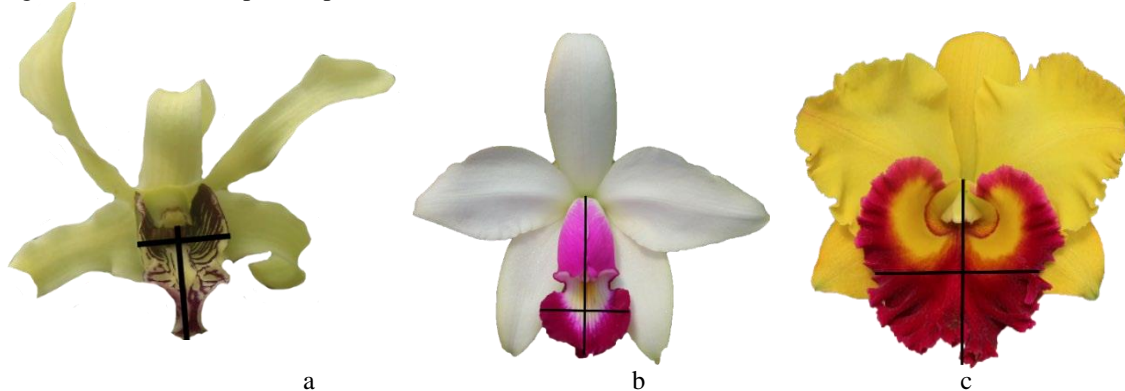

a   b   c

Figure 5. *Golden ratio of patterns on flower petals (a) Dendrobium wulaiense, (b) Catelea violacea semi alba, and*
(c) Rhyncattleanthe thongsuphan gold

The golden ratio is then found in the comparison of long and short distances, which is the distance measured from one end of the canopy to the other. The golden ratio in this position is found in Catelea emma salosa and Dendrobium black alien gold. In the Catelea emma salosa flower, the ratio was found to be 64.7 mm/40 mm, which produced a value of 1.618, and in the Dendrobium black alien gold flower, the ratio was found to be 45.2 mm/27.9 mm, whichproduced a value of 1.620.
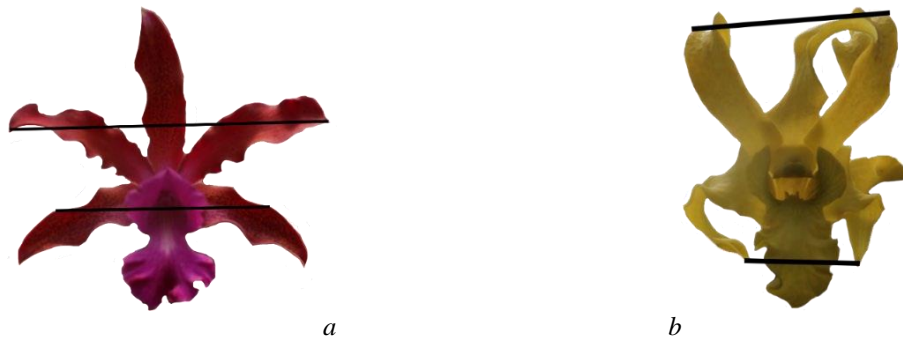
<center>a   b</center>

Figure 6. *Golden ratio of long and short flowers of (a) Catelea emma salosa and (b) Dendrobium black alien gold*

Another golden ratio is found in the ratio of the total height of the flower to the total width of half the flower. Thegolden ratio in this position was found in the Japanese Jasmine (Pseuderanthemum) flower, the ratio was found to be 14.8 mm / 8.95 mm which resulted in 1.653 and in the Red Sage (Salvia miltiorrhiza) flower the ratio was found to be 58.1 mm / 35.8 mm which yields 1,622
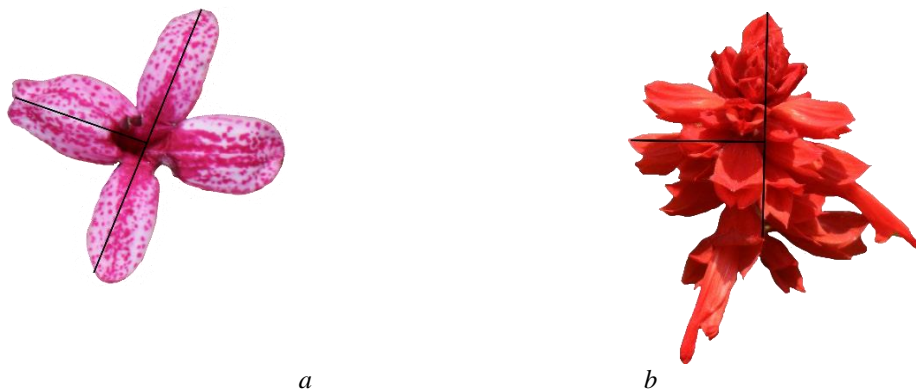

<center>a   b</center>

Figure 7. *Golden ratio of total height to total width of half flowers (a) Japanese Jasmine (Pseuderanthemum) and*
(b) Red Sage (Salvia miltiorrhiza).

The golden ratio is then found in the comparison of flower patterns, which is the distance measured from the total height of the flower to one of the color patterns on the flower. The golden ratio in this position is found in Blue Thanbergia flowers (Thanbergia laurifolia) with a ratio of 20.7 mm / 12.8 mm which produces 1.617 and Dutch Jasmine flowers (Quisqualis indica) with a ratio of 16.9 mm / 10.3 mm which produces 1.6407 as well as Indian Clock Vine (Thunbergia mysorensis) flowers with a ratio of 23 mm / 13.9 mm which produces 1.654.
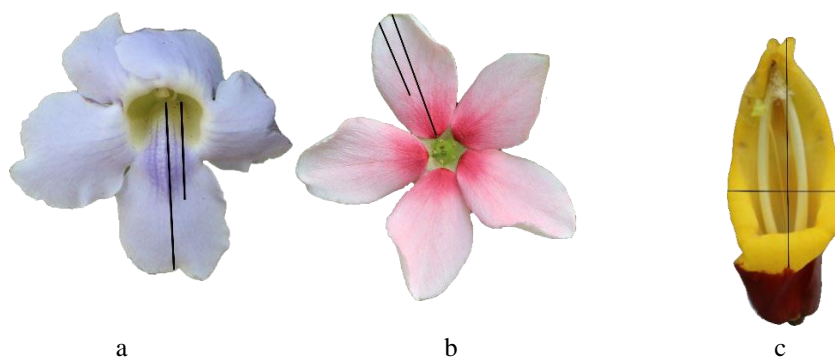

<center>a   b   c</center>

Figure 8. *Golden ratio in flower patterns of (a) Blue Thunbergia (Thunbergia laurifolia), (b) Dutch Jasmine (Quisqualis indica) and (c) Indian Clock Vine (Thunbergia mysorensis).*

The golden ratio is then found in the ratio of the total height of the flower to the total width of the flower. The golden ratio in this position is found in Jambang flowers (Syzygium cumini) with a ratio of 42 mm / 26.1 mm which produces 1.609 and flowers (Debdrobium strepsi ceros) with a ratio of 82.4 mm / 51 mm which produces 1.615.
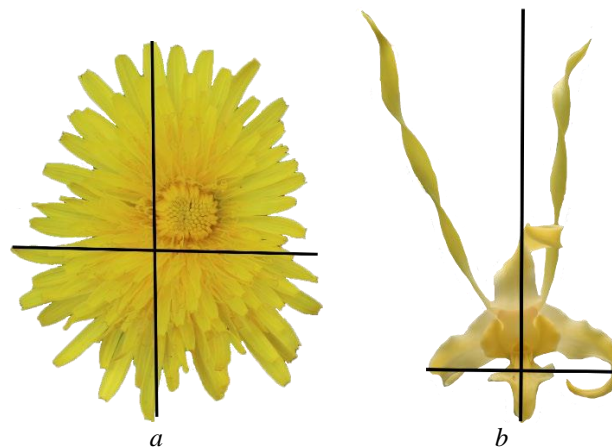

a   *b*

Figure 9. *Golden ratio of total flower height to total flower width (a) of Jambang (Syzygium cumini) and flower (b)(Debdrobium strepsi ceros).*

Flowers as a Tourist Attraction

Flowers as one of the attractions have been recorded in detail in the holy books, one of which is the Al-Quran in Surah Qaaf (50): 7, namely, "And We spread out the earth, and We placed on it sturdy mountains, and We grew on it all kinds of plants that are beautiful to the eye. This suggests that humans were created by the Almighty for various visual pleasures. Through the assessment of the golden ratio in this research, it is hoped that flowers in all their forms of beauty can be interpreted well as part of a tourist attraction. Various related literature studies on flowers as a resource in tourist attraction areas show that flowers have a strong connection to educational, recreational, and historical functions in tourist spaces in Malang.

Flowers are always interpreted as beauty, so there is no doubt about making flowers a superior source for a tourist attraction. According to Swarbrooke (2002), tourist attraction has the meaning of everything—both places and activities—that can attract tourists or visitors to come with the aim of traveling or recreating using their free time. Based on previous research studies, several factors that support the development of flowers as a tourist attraction include beauty. Various tourist attractions based on flower plants have been developed in Malang with various unique characteristics for visualizing the beauty of flowers. as an example of a tourist attraction in the Batu Malang area.

Various efforts through the packaging of flower tourism products through good interpretation are presented in Batu Malang with the uniqueness of educational tourism. Apart from that, in Malang City, the use of flowers is an important presence in the arrangement of Malang as a friendly city by providing open spaces with various flower collections adapted to the location.

Flowers as a tourist attraction cannot be separated from the process of interpretation during the journey. Interpretation is understood as revealing the meaning and relationships of objects through individual and group experiences (Tilden, 2007). Apart from that, Helianthi (2022) emphasizes the success of the interpretation process, namely the presence of new experiences for the viewer of an object. This meaning can be understood to mean that by using flowers as a tourist attraction capital, it should be accompanied by a good interpretation. A good interpretation process is closely related to visitors' willingness to enjoy flowers so that, in the end, there is a positive interaction.

IV. Conclusion

The results of the analysis show that all flowers in the Malang area meet the golden ratio criteria. The results of a literature study illustrate that the function of flowers as ornamental plants dominates the characteristics of flowers in the Malang area. The golden ratio is most often found in the ratio between the length and width of the petals of each flower. Flowers as a tourist attraction in Malang have developed and grown with various uses. Commercial use of flowers in several tourist attractions and public spaces in the planning of a city

Efforts to optimize the use of flowers as part of the attraction will not be free from interpretation. Interpretation is able to translate and change the values and attitudes of individuals and groups towards the positive goals to be achieved. Presenting interpretation as an inseparable part of the pursuit of flowers as a tourist attraction is expected tofoster repeated recreation and sustainable educational benefits.

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