



Research Article

Diversity and potential of coffee plant types in Lawang Taji, Gunung Karang, Pandeglang Regency, Banten

Lulu Lutfiah^{1,*}, Eni Nuraeni², Azizah Fauziah Rahma¹, Bima Oktavianto¹, and Pepi Nur Susilawati³

¹ Biology Study Program, Faculty of Science, Sultan Maulana Hasanuddin State Islamic University Banten, Jl. Syech Nawawi Al-Bantani, Kp. Andamu'i, Kel. Sukawana, Kec. Curug, Serang City 42171, INDONESIA

² Department of Biology, Faculty of Science, Sultan Maulana Hasanuddin State Islamic University Banten, Jl. Syech Nawawi Al-Bantani, Kp. Andamu'i, Kel. Sukawana, Kec. Curug, Serang City 42171, INDONESIA

³ Research Center for Food Crops, National Research and Innovation Agency (BRIN), Jl Raya Bogor Km 46, Cibinong, Bogor 16911, INDONESIA

* Corresponding author (✉ 211710024.lulu@uinbanten.ac.id)

ABSTRACT

The challenge of cultivating coffee plants is that the process is still traditional, and the types of coffee that are superior are still limited. Therefore, data collection is needed to determine the potential of coffee plants in developing cultivation. The purpose of this research was to study the diversity and potential of coffee types and the ecological conditions of Gunung Karang coffee valley. The research was conducted from March to June 2024 at Lembur Kopi Citaman Lawang Taji, Sanim Village, Juhut Village, Karang Tanjung District, Pandeglang Regency, Banten. The sampling technique was purposive sampling, and the data obtained from observations and interviews were analyzed using descriptive qualitative methods. The results showed that six types of coffee can be cultivated, namely Arabica, Robusta, Liberica, Excelsa, Purpurascen, and Robusta. Menhir coffee had unique flavors and aromas with distinctive flavors of brown sugar, nuts, chocolate, spices, vanilla, and acid. Morphological analysis of the six types of coffee showed the same characteristics in the branching system. The ecological characteristics of coffee plants included altitude criteria of 550-600 masl, pH between 5-8, air temperature 28-29 °C, air humidity between 70%-76%, and humus-dominant soil conditions. These land criteria were categorized as sufficient to meet coffee growth.

Edited by:

Ahmad Rifqi Fauzi
Trilogi University

Received:

28 September 2024

Accepted:

13 December 2024

Published online:

27 December 2024

Citation:

Lutfiah, L., Nuraeni, E., Rahma, A. F., Oktavianto, B., & Susilawati, P. N. (2024). Inventory and identification of coffee plant types in Lawang Taji, Gunung Karang, Pandeglang Regency, Banten. *Jurnal Agronomi Indonesia (Indonesian Journal of Agronomy)*, 52(3), 358-367

Keywords: coffee farm; coffee ecology; coffee menhir; morphology of coffee

INTRODUCTION

Coffee (*Coffea* sp.) is a tropical plant that has been around since the Dutch colonial era. Coffee is one of the agro-industrial food products widely consumed for its benefits (Harahap et al., 2023). Coffee is popular among teenagers, adults, and parents who cannot stop drinking coffee (Kurnia et al., 2023). The popularity of coffee is known for its taste, aroma, color, and effects on health (Idris et al., 2023). Ordinary people only know the benefits of coffee to relieve drowsiness. However, coffee has many advantages in various aspects, such as health, beauty, and business. In terms of health, coffee is considered to relieve stress, reduce the risk of heart attack and stroke, and become one of the drinks that are high in antioxidants, so it is good for the health of the body. Coffee is also used as a base for masks or body scrubs for body care in beauty products. Furthermore, from an

economic aspect, coffee can be a promising business that can improve regional and even national economies (Irwanti, 2017).

Being the fourth largest coffee-producing country in the world, Indonesia treasures coffee as one of the essential plantation commodities due to its contribution to the improvement of the country's economy, providing employment, income for coffee farmers, and foreign exchange (Ardiansyah et al., 2024). BPS (2021) revealed that from 2019 to 2021, Indonesia's coffee production increased by 4.48%, from 752.51 thousand tons in 2019 to 786.91 thousand tons in 2021. The increasing export volume is accompanied by a decrease in coffee imports. Both domestic and foreign coffee trade contribute greatly to the country's foreign exchange earnings. Coffee export volume in the 2017-2019 period reached an average of 368,935 tons with an average foreign exchange gain of 566,352 USD.

Indonesia has various coffee varieties, namely Robusta coffee (*Coffea canephora* or *Coffea robusta*), Arabica (*Coffea arabica*), and Liberica (*Coffea liberica*), which are currently being developed in Indonesia (Ardiansyah et al., 2024). Indonesia is known as the main producer of robusta coffee (*Coffea canephora* or *Coffea robusta*), with the percentage of exports per year reaching 85%, compared to only 15% for Arabica coffee (Sakiroh & Ibrahim, 2020; Septiani et al., 2021). The high production of arabica and robusta coffee is due to each of these coffees having unique characteristics and advantages. Arabica coffee has a more complex taste. In contrast, robusta coffee has a more bitter and slightly sour taste (Purwanto et al., 2015). Commercially, Indonesia can produce two types of coffee, namely high-quality arabica (*Coffea arabica*) and Robusta (*Coffea canephora* or *Coffea robusta*). Both types of coffee are exported to countries such as the United States, the Netherlands, Germany, Italy, and Japan (Amalia et al., 2023).

Indonesia has widespread coffee plantations, including in Banten Province. In this province, there are three coffee-producing regencies, one of which is Pandeglang Regency. This district tends to have a tropical climate with high rainfall. Located in the southwest of Banten Province, Pandeglang is geographically located between 6.21'-7.10' South latitude and 104.8'-106.11' East longitude. One of the famous coffee plantation areas in Pandeglang Regency is Lembur Kopi Citaman Lawang Taji Gunung Karang, which is located in Sanim Village, Juhut Sub-district, Karang Tanjung District. It is situated at an altitude of around 500-1000 meters above sea level, and the soil conditions are loamy and slightly rocky (PPID Pandeglang, 2019).

Lembur Kopi Citaman Lawang Taji has several types of coffee plants that are cultivated, including Robusta coffee (*Coffea canephora* or *Coffea robusta*), Arabica (*Coffea arabica*), Liberica (*Coffea liberica* var. *Liberica*) and others (Idris et al., 2023). The challenge in cultivating these coffee plants is that the process is still carried out traditionally, and the types of coffee that are superior commodities are still limited. Therefore, data collection is needed to determine the potential of coffee plants in cultivation development and area management planning. The farmer group members are committed to developing coffee plants and improving coffee cultivation and management skills in the region with collaborative efforts and shared knowledge (Idris et al., 2023).

Research on coffee, particularly the diversity of coffee plants in Gunung Karang Coffee Valley, has been limited. The results of this study are expected to increase understanding of the diversity of coffee plants and the condition of the area based on morphology and habitat characteristics. The study results are said to be based on the research reference (Kurnia et al., 2023). Thus, the results of this study can be used to educate students and academics on coffee. The purpose of the Lawang Taji coffee inventory research was to study the diversity and potential of each type of coffee and to know the ecological conditions in the Citaman coffee valley of Lawang Taji Gunung Karang, Pandeglang Regency, Banten, for the advancement of quality coffee production and better coffee area management planning.

MATERIALS AND METHODS

Research site

The research was conducted from March 2024 to June 2024. This research was conducted at Lembur Kopi Citaman Lawang Taji at the coordination point 6°16'48" S and 106°05'31" E, Sanim Village, Juhut Sub-district, Karang Tanjung District, Pandeglang Regency, Banten.

Research materials

The tools used in this research were a phone camera, *Descriptor for Coffee* guidelines (IPGRI, 1996), plant scissors, ruler, soil tester, altimeter, and stationery. The materials used in this study were label paper and several types of coffee plants, such as Robusta, Arabica, Excelsa, Liberia, Purpurascens, and Robusta Menhir.

Research procedure

This research used exploratory and descriptive qualitative methods. The research process included location identification, sampling, and data collection. The purposive sampling technique was used to determine the research location (Kurnia et al., 2023). Sampling was conducted through exploratory methods. Exploratory research is a method used to collect data to answer questions of interest to researchers by exploring and recognizing certain phenomena (Mudjiyanto, 2018). Coffee exploration was carried out randomly at the research location in Lembur Coffee by selecting 5 samples of coffee types. Selected plant samples were recorded and documented. Data collection was carried out through observation and interviews. Observations were conducted at Lembur Kopi Citaman Lawang Taji, while interviews with coffee farmers were used to complement observation data.

The working procedure of this research was divided into three parts: plant exploration, characterization of coffee plants, and habitat exploration. Plant exploration was carried out using the scanning method, including searching, collecting coffee samples, and observing the types of coffee plants. Coffee plant characterization included the identification and determination of coffee characteristics with 14 qualitative parameters based on the Descriptors for Coffee characterization guide (IPGRI, 1996). Then, the results of these observations were documented and evaluated. Determining the characteristics of the coffee ecological habitat included measuring altitude using an altimeter. It also measured temperature, pH, sunlight intensity, and air humidity using a soil tester placed under the selected coffee plants. The dominant soil condition was slightly stony loamy soil.

Data analysis

Data in the form of coffee plants were analyzed using qualitative descriptive methods. This method is a research design that is often used to examine natural objects in natural conditions that are not regulated by certain treatments (Rusandi & Rusli, 2021). The coffee plant data obtained were then described by their qualitative characteristics, which were decomposed into 14, namely: plant stature, stipule shape, leaf shape, leaf tip shape, young leaf color, leaf length, leaf width, leaf petiole (petiole) color, young shoot color, fruit shape, fruit color, pulp thickness, seed shape, and branching system. The characteristics of the coffee ecological habitat included measuring altitude with an altimeter, measuring temperature, pH, sunlight intensity, air humidity using a soil tester, and soil conditions found at the research site.

RESULTS AND DISCUSSION

This exploration research succeeded in obtaining six types of coffee plants in Lembur Kopi Citaman Lawang Taji Gunung Karang, Pandeglang Regency, Banten. The types of coffee found in Lembur Kopi Citaman Lawang Taji were Robusta coffee (*Coffea canephora* or *Coffea robusta*), Arabica (*Coffea arabica*), Liberica (*Coffea liberica* var. *Liberica*), Excelsa (*Coffea dewevrei*), Purpurascens, and Robusta Menhir. The diversity of coffee species found in Lembur Coffee can be caused by genetic and environmental factors. The six coffee

species showed morphological variations, especially in qualitative characteristics such as plant stature, stump shape, leaf shape, leaf tip shape, young leaf color, petiole color, young shoot color, fruit shape, fruit color, pulp thickness, seed shape, branching system, and leaf length and leaf width identified using *Descriptor for Coffee* (IPGRI, 1996). The qualitative characteristics of coffee are shown in Table 1.

Table 1. Qualitative and quantitative data of coffee plant characters.

Coffee plant characters	Citaman lawang taji coffee plant types					
	Arabica	Robusta	Liberica	Excelsa	Purpurascens	Robusta Menhir
Plant stature	Short tree	Short tree	Tree	Short tree	Short tree	Short tree
Stipule shape	Ovule	Triangle	Ovule	Triangle	Triangle	Ovule
Leaf shape	Lanceolate	Elliptic	Elliptic	Elliptic	Elliptic	Lanceolate
Leaf tip shape	Apiculate	Apiculate	Acute	Acute	Apiculate	Apiculate
Young leaf color	Blackish brown	Greenery	Brownish	Brownish	Blackness	Green
Leaf length	25 cm	26 cm	34 cm	40 cm	27 cm	18 cm
Leaf width	9 cm	17 cm	15 cm	20 cm	13 cm	7 cm
Leaf petiole color	Green	Dark green	Green	Green	Blackish brown	Green
Young shoot color	Light green	Light green	Brownish	Brownish	Blackish brown	Light green
Fruit shape	Elliptic	Roundish	Roundish	Roundish	Roundish	Roundish
Fruit color	Glossy red	Glossy purplish	Purplish red	Glossy red	Dull Blackish Brown	Glossy Purplish red
Pulp thickness	Medium	Thin	Thick	Thick	Medium	Thick
Seed shape	Ovate	Obovate	Round	Round	Ovate	Elliptic
Branching system	Monopodial	Monopodial	Monopodial	Monopodial	Monopodial	Monopodial

Note: The descriptor of coffee plant characters is adapted from Descriptors for Coffee (IPGRI, 1996).

Based on the data in Table 1, the qualitative characteristics of coffee in Lembur Kopi Citaman Lawang Taji showed that there were differences in morphological characteristics in the six types of coffee in terms of petiole shape, leaf shape, leaf tip shape, young leaf color, leaf length, leaf width, petiole color, leaf shoot color, young shoot color, fruit shape, fruit color, pulp thickness, and seed shape. These morphological differences can be caused by genetic factors, the environment, or the interaction of the two. There was an additional influence from cultivation methods, which can cause differences in observed morphology (Ardiansyah et al., 2024). As practiced by farmers in Lembur coffee, the cultivation method used seeds and was assisted by grafting superior seeds so that the resulting coffee plants were more varied. The common characteristic of the six types of coffee plants was their branching system, which included monopodial branching. Monopodial is a branching system that clearly shows the difference between the main stem and branches in coffee plants.

The stature of coffee plants found in Lembur Kopi was mostly short tree stature whose height is <5 m, and there were one or more trunks. Among the coffees with short stature were Arabica, Robusta, Excelsa, Purpurascens, and Robusta Menhir coffee. Meanwhile, Liberica coffee (*Coffea liberica* var. *Liberica*) had a tree plant stature whose plant is >5 m tall and has a large main stem.

Morphological characteristics of coffee leaves

Arabica and Purpurascens coffee plants had the same tendency in the color of young leaves, which was blackish brown in Arabica coffee and blackish in Purpurascens coffee. Similar characters in the color of young leaves were followed by Liberica and Excelsa coffee, which was brownish. Arabica, Liberica, and Robusta Menhir coffee plants had similarities in the shape of the stipules, which were ovule-shaped. In contrast, Robusta, Excelsa, and Purpurascens coffee had the same stipule shape, which was triangular. The dominant characteristics of leaf shape and leaf tip shape in coffee plants were elliptical and apiculate. The two characters are presented in (Figure 1). Differences in leaf shape

morphology and leaf tips of coffee plants at the research site can be caused by environmental factors and genetic factors as determinants of morphology. The ability of leaves to change phenotypes is a leaf response to show the changing environmental conditions that occur, such as the shape of the leaves being smaller when the coffee plant is in a deficit of water and nutrients needed (Efendi et al., 2020).

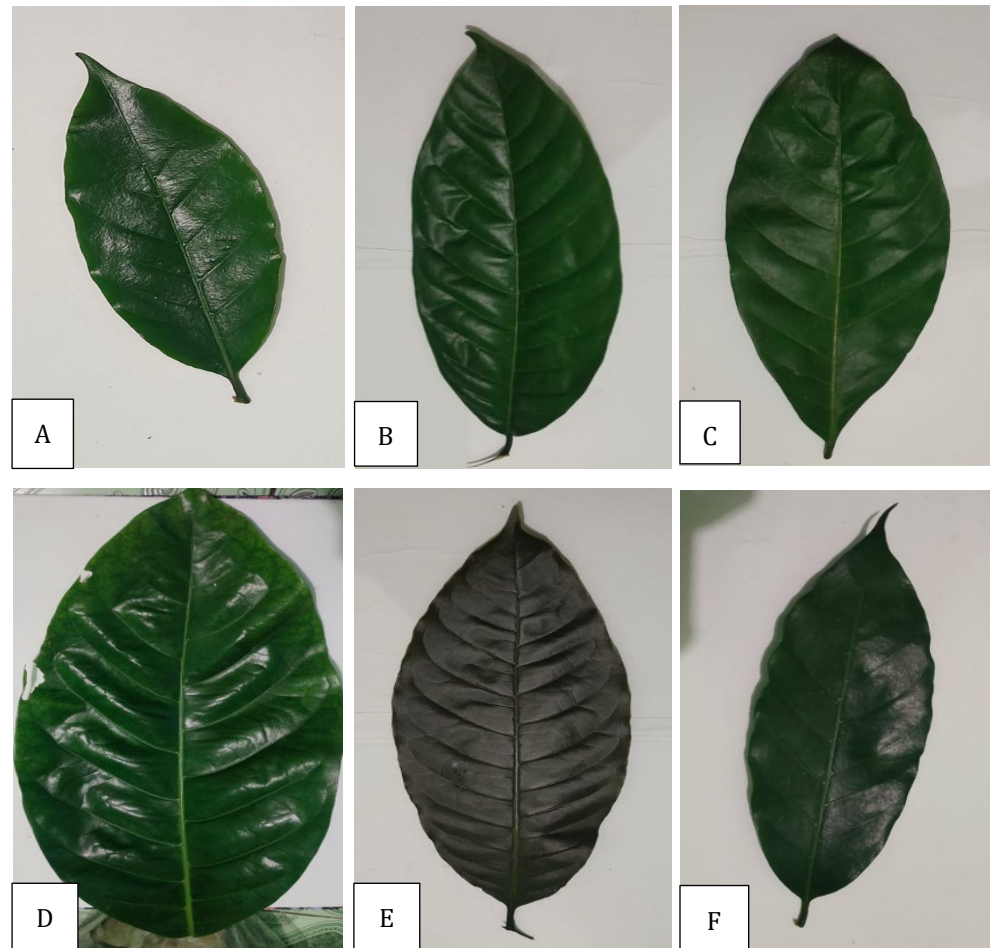


Figure 1. Characteristics of leaf shape and leaf tip of local coffee plants Lembur Kopi Gunung Karang. Leaf characters of (A) Arabica, (B) Robusta, (C) Liberica, (D) Excelsa, (E) Purpurascen, (F) Robusta Menhir.

The color character of the petiole leaves that dominate the local Lembur Kopi coffee plants was green, followed by dark green color in Robusta coffee and blackish brown color in Purpurascen coffee. The color of young shoots on the characteristics of coffee plants had a slight variation: light green, brownish, and blackish brown. The characteristics of leaf length and width on coffee plants tended to vary, with Liberica and Excelsa coffee having leaf lengths of about 34 cm and 40 cm larger than other types of coffee. The difference was seen in the Robusta Menhir coffee type, which only had a leaf length of about 18 cm and a leaf width of 7 cm. In comparison, Excelsa and Robusta coffee had larger leaf widths of about 20 cm and 17 cm.

Morphological characteristics of coffee fruits and beans

The shape of the coffee fruit found in Lembur Kopi characteristically appeared to tend to be slightly round based on the *Descriptor for Coffee* guidelines (IPGRI, 1996). Of the six types of coffee, five had similarities in the shape of the coffee fruit, which was roundish. Meanwhile, Arabica coffee (*Coffea arabica*) had a different fruit shape, which was elliptic in shape. The glossy red and glossy purplish red color of the coffee fruit was more dominant than other colors, such as dull blackish brown on Purpurascen coffee and glossy

purplish on Robusta coffee. The differences in fruit shape and fruit color are shown in Figure 2.

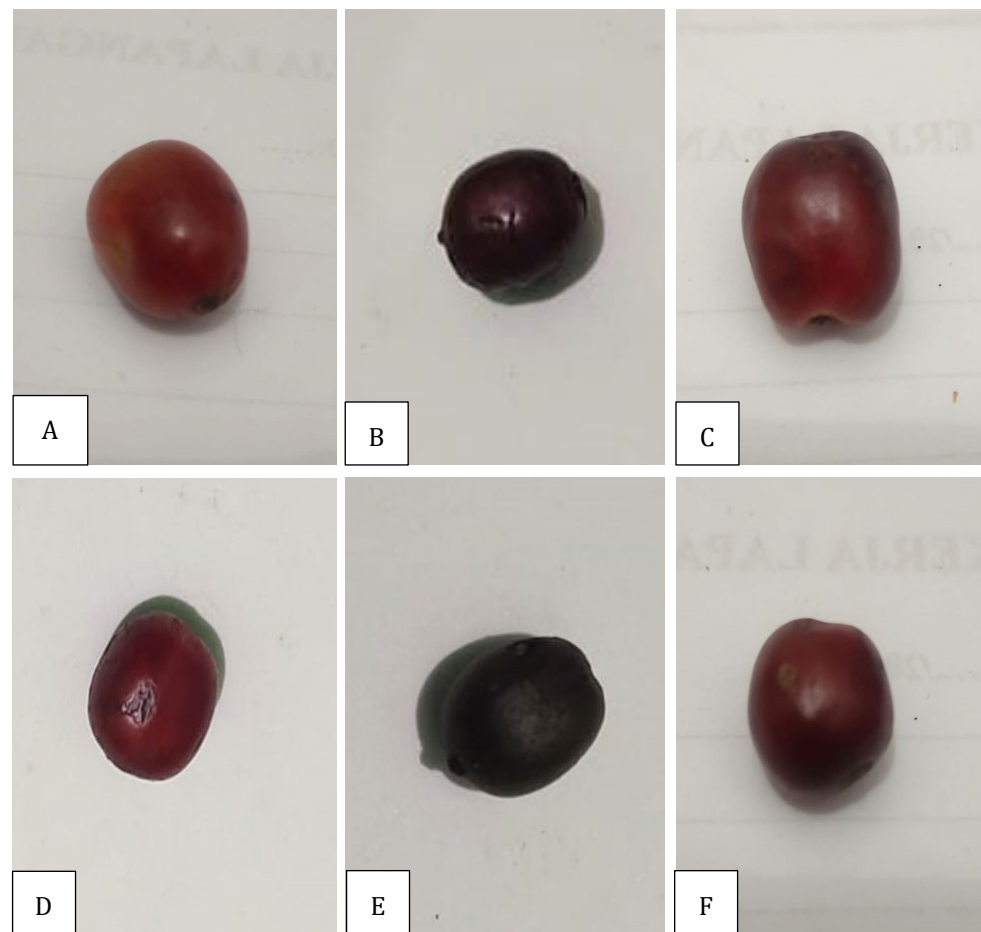


Figure 2. Fruit shape and fruit color characters on coffee plants in Gunung Karang Coffee Valley. Coffee fruit characters (A) Arabica, (B) Robusta, (C) Liberica, (D) Excelsa, (E) Purpurascen, (F) Robusta Menhir.

The differences seen in the morphology of coffee fruit color can be caused by several factors, such as the harvested fruit not being physiologically ripe in time. The difference in fruit color that appears indicates a level of fruit maturity. Coffee fruit can be harvested when it is 10 to 11 months old (red coffee fruit) (Tarigan & Towaha, 2017). Hayati et al. (2012) revealed that the color change of coffee fruit from green to red is the result of the reaction of chlorophyll pigment loss and anthocyanin accumulation naturally with the help of hydrolase enzymes induced by the ethylene hormone. Ethylene hormone works during the ripening process by breaking chlorophyll in green fruit into red or orange color because it has xanthophyll and carotene.

The characteristics of the coffee fruit can be recognized from the level of maturity, such as the green and yellowish green color, which indicates that the coffee fruit is still young with pale, whitish seeds and wrinkles when picked. After the coffee fruit is dark red, it means that the coffee is ripe with a fully formed aroma and taste. Meanwhile, if the coffee fruit has reached an excessive level of maturity, it will appear dark red, indicating that the seeds are blackish brown, and the aroma has diminished and gives off a taste like the smell of soil. Physically, the properties of young fruit change, including changes in color and a softer texture when the fruit is ripe (red). In addition to physical changes, chemical changes can also occur in the increase of water content, sugar, vitamin C, and organic acids (Alam et al., 2023).

Based on the results obtained, the thickness of the pulp in the six coffees tended to be thick with a thickness of about 2 cm, while the thickness of the pulp in Arabica and Purpurascen coffee tended to be more moderate with a thickness of about 1cm. The shape of the beans in this coffee was various, such as round, ovate, obovate, and elliptic. The relationship between genetic and environmental factors affects the phenotypic characteristics of coffee plants, while the environmental conditions of coffee plants significantly affect the vegetative and generative growth stages of coffee (Zasari et al., 2023). Variations in qualitative characteristics of leaves, fruits, seeds, and morphology of coffee plants can be caused by various environmental conditions required in coffee cultivation, namely climate, topography, and soil type (Prastowo & Arimarsetiowati, 2019).

Ecological characteristics of coffee plants

Lembur Kopi Citaman Lawang Taji is located in Pandeglang Regency, Banten Province. Lembur Kopi has an area of about 120 ha, with 9 ha planted with coffee. This area has suitable environmental conditions for coffee growth because it is located on Mount Karang, which has a tropical climate, high rainfall, and an altitude between 500-1.000 meters above sea level, which supports coffee cultivation. Ginting et al. (2022) stated that the character and growth of coffee can be influenced by environmental factors such as soil conditions, climate, altitude, and temperature. The ecological characteristic of coffee plants in Lembur Kopi is presented in Table 2.

Table 2. Ecological characteristics of coffee plants.

Ecological characteristics of coffee plants	Citaman Lawang Taji coffee types					
	Arabica	Robusta	Liberica	Excelsa	Purpurascens	Robusta Menhir
Land elevation	607 masl	600 masl	604 masl	600 masl	607 masl	550 masl
pH	5	8	5.5	8	6.5	8
Temperature	28.3 °C	28.9 °C	29.3 °C	28.5 °C	29.8 °C	28 °C
Sunlight intensity	100%	100%	100%	100%	100%	100%
Air humidity	76%	75%	70%	76%	76%	76%
Soil condition	Humus soil	Humus soil	Humus soil	Humus soil	Humus soil	Rocks

Based on the table above, the land elevation of the six coffee types was around 550-607 meters above sea level. This altitude was categorized as very suitable for Robusta and Robusta Menhir coffee plants. This is in line with the research of Mulyana et al. (2017), which revealed that Robusta coffee plants (*Coffea canephora* or *Coffea robusta*) can grow at altitudes below 1,000 masl. Meanwhile, the type of Arabica coffee (*Coffea arabica*) has growing suitability in a temperate climate with an altitude of 700-1,500 masl (Sulistiani et al., 2023; Satibi et al., 2019). Generally, the type of Arabica coffee (*Coffea arabica*) is suitable for growing at an altitude above 1,000 masl, but this research was only conducted at an altitude below 1,000 masl. So that data collection is only carried out in accordance with the research location. Widayani and Usodri (2020) revealed that coffee plants should be planted in soils that have high nutrients and organic substances, with an average pH between 5-7. While the pH of the Lembur Kopi soil is around 5-8, this pH can be categorized as quite suitable for coffee plants.

Atmospheric temperature is the degree of heat or coldness of the air in it. Based on the distribution of temperature on the earth's surface, the temperature is divided into two areas: horizontal and vertical distribution. The duration of solar radiation is one of the factors that can directly affect changes in air temperature. The appropriate air temperature for Arabica coffee plants ranges from 15-20 °C, while for Robusta coffee, it ranges from 21-24 °C (Mulyana et al., 2017). In the table above, the average air temperature of coffee plants was in the range of 28-29 °C. Agustin (2019) revealed that a very suitable temperature (S1) for coffee plants is in the range of 20-24 °C, a suitable temperature (S2) is in the range of 24-28 °C, while a temperature of 28-32 °C is included

as the moderately suitable temperature category (S3). Coffee plants can grow optimally in air humidity between 70%-85%, according to the research results obtained from the air humidity in Lembur Kopi.

Coffee plants are C3 plants, which means they do not require full sunlight (Anita et al., 2016). However, coffee plants need shade from other plants so that the intensity of sunlight received is not excessive. Differences in the type of shade can cause differences in light intensity if the excessive shade phase results in decreased photosynthetic conditions and coffee production (Lumbanraja et al., 2021). Based on the research, it was found that the intensity of incoming sunlight was at 100%, which meant that all sunlight enters the coffee plants without any barrier or shade. This affected the growth, production, and flavor of the coffee. It can cause the death of coffee plants if the intensity of light is too high. Hence, it is necessary to shade other plants to increase the production and quality of coffee plants. Meanwhile, the soil conditions at the research site tended to be rocky humus soil, which was suitable for agriculture and plantations.

Lembur Kopi has a unique coffee variant to Mount Karang, namely Menhir GK Coffee. According to Mr. Maman (Chairman of the Lembur Kopi Farmer Group), Menhir GK Coffee is a type of Robusta coffee (*Coffea canephora* or *Coffea robusta*) whose plants are hundreds of years old and grow between the cracks of coral rocks. Robusta and Arabica coffee has adapted to biotic stresses (pests and diseases, such as leaf rust disease) and abiotic stresses (land, pH, Temperature, humidity, and light). The results of observations and information from residents showed that robusta and arabica coffee grew well without the potential for leaf rust disease even though they were planted at an altitude of 500-600 meters above sea level. This coffee plant is an ancestral heritage that is maintained and processed with the concept of contemporary science without having to change environmental sustainability.

Menhir GK coffee thrives and spreads at an altitude of 600-800 meters above sea level in Kadu Betung Lawang Taji block, Gunung Karang Juhut Sub-district, Karang Tanjung District, Pandeglang Regency, Banten. Local people usually call it Meneer coffee because it was consumed by the Dutch, and some also call it small bean coffee because it is smaller than the general coffee beans. Menhir GK coffee is traditionally processed by selecting quality coffee beans that are fully ripe during the harvest process. This coffee is unique with its distinctive flavor and aroma. The data result of the taste test on Menhir GK coffee is shown in Table 3 below.

Table 3. Menhir GK coffee taste test report of the quality

Characteristic	Cup testing score	Characteristic	Cup testing score
Fragrance	8.13	Uniform cups	10.00
Flavor	8.13	Balance	8.00
Aftertaste	7.88	Clean cups	10.00
Salt/Acid	8.13	Overall	8.00
Bitter/Sweet	8.13	Taints-Faults	0.00
Mouthfeel/Body	8.00	Final score**	84.38

Note: Score notation: 6.00-6.75 = Good; 7.00-7.75 = Very good; 8.00-8.75 = Excellent; 9.00-9.75 = Outstanding. Coffee taste test report sourced from LP PUSLITKOKA Indonesia.

Based on Table 3, the taste test results of Menhir GK Coffee showed a cup testing score of 8.13 on the characteristics of fragrance, flavor, acid, and sweetness. It was unique with flavors and aromas of brown sugar, nuts, chocolate, spices, vanilla, acid, and a soft taste with moderate caffeine levels so that it can be enjoyed by all groups. The results of this test were obtained from the Indonesian Coffee and Cocoa Research Institute "LP PUSLITKOKA" in Jember, East Java. The results showed that Menhir GK coffee received a score of 84.38, which falls into the Excellent category. The Excellent category in coffee means that the coffee has a high-quality value in terms of taste and character, and the entire long series of coffee journeys from processing to serving is presented perfectly and completely.

CONCLUSIONS

Based on research conducted at Gunung Karang Coffee Valley, the results showed that in this location, 6 types of coffee plants were found, namely Robusta (*Coffea canephora* or *Coffea robusta*), Arabica (*Coffea arabica*), Liberica (*Coffea liberika* var. *Liberica*), Excelsa (*Coffea dewevrei*), Purpurascens, and Robusta Menhir. Among the six types of coffee found, there was only one similarity, which was the monopodial branching system. Arabica coffee and Robusta Menhir were two types of coffee that had the potential to produce quality coffee because of their morphological characteristics, habitat, and unique taste. The superiority of these two types of coffee was supported by the existence of abundant varieties, production, and high quality compared to other types of coffee and the existence of supporting factors, such as abiotic and biotic factors, that were suitable for the growth of these two types of coffee. The study results showed that the ecological characteristics of coffee plant land were altitude criteria at 550-600 masl, pH between 5-8, ambient temperature 28-29 °C, and air humidity between 70%-76%, and dominant soil conditions were slightly rocky humus soil. These land criteria were categorized as quite suitable for the needs of coffee plant growth and the progress of the Lembur Kopi Gunung Karang area planning.

ACKNOWLEDGEMENTS

The authors would like to thank Mr. Maman, the head of the Coffee farmer group in Gunung Karang Coffee Valley, Mrs. Eni Nuraeni, S.Pd., M.Si. and Dr. Pepi Nur Susilawati, S.P., M.Si. as the supervisor, as well as the KEHATI Foundation Biodiversity Warriors who have provided funding for this research. The authors would also like to thank the ROBUSTA team friends who have always helped with this research.

REFERENCES

- Agustin, E. (2019). *Analysis of Land Suitability for Jopi Crops in Jambu District, Semarang Regency* [Bachelor's Thesis., University of Muhammadiyah Surakarta]. University of Muhammadiyah Surakarta Digital Respository. <https://eprints.ums.ac.id/79176/2/NASKAH%20PUBLIKASI.pdf>
- Alam, I., Warkoyo, W., & Siskawardani, D. D. (2023). Characteristics of the maturity level of robusta coffee fruit (*Coffea canephora* A. Froehner) and arabica coffee fruit (*Coffea arabica* Linnaeus) on the taste quality of brewed coffee. (In Indonesian.). *Food Technology and Halal Science Journal*, 5(2), 169-185. <https://doi.org/10.22219/fths.v5i2.21925>
- Amalia, I., Abubakar, Y., & Indarti, E. (2023). Physical quality analysis of Gayo Arabica coffee from different altitudes and varieties. (In Indonesian.). *Jurnal Ilmiah Mahasiswa Pertanian*, 8(4), 534-539.
- Anita, A., Tabrani, G., & Idwar, I. (2016). Arabica coffee (*Coffea arabica* L.) seedling growth in the peat medium at various levels of shading and nitrogen fertilization. *Jurnal Online Mahasiswa Fakultas Pertanian*, 3(2), 1-9.
- Ardiansyah, A., Mahulette, A. S., & Marasabessy, D. A. (2024). Morphological characterization of coffee plants (*Coffea* sp.) in Leihitu District, Central Maluku Regency. *Jurnal Agrohut*, 15(1), 19-29. <https://doi.org/10.51135/agh.v15i1.309>
- BPS. (2021). *Indonesian Coffee Statistics 2021*. BPS-Statistics Indonesia.
- Efendi, M., Rustandi, U., Sunandar, D., & Windarsih, G. (2020). Notes of intraspecies morphological variation on *Begonia areolata* Miq. based on living collection in Cibodas Botanic Gardens, West Java. (In Indonesian.). *Jurnal Biologica Samudra*, 2(2), 103-113.
- Ginting, A. A., Lubis, S. N., & Kesuma, S. I. (2022). Comparative and competitive advantage of Arabic Coffee in Karo Regency, North Sumatra Province, Indonesia. (In Indonesian.). *Agro Bali: Agricultural Journal*, 5(3), 592-600. <https://doi.org/10.37637/ab.v5i3.1045>
- Harahap, M. P. M., Analiasari, A., & Agasi, T. N. (2023). Physical characteristics of coffee beans produced by business units in West Lampung Kebun Tebu District. (In Indonesian.). *Jurnal Pengembangan Agroindustri Terapan*, 2(2), 25-34. <https://doi.org/10.25181/jupiter.v2i2.3203>
- Hayati, E. K., Budi, U. S., & Hermawan, R. (2012). Total concentration of anthocyanin compounds of rosella petals (*Hibiscus sabdariffa* L.) extract: temperature and ph. *Jurnal Kimia*, 6(2), 138-147.

- Idris, I., Wahyudi, W., Pakpahan, M., Tju, T. E. E., Handoko, Y., & Khiatuddin, M. (2023). Liberica coffee tree planting in Citaman coffee farmer group Lawang Taji Pandeglang. (In Indonesian.). *Community: Jurnal Pengabdian Pada Masyarakat*, 3(2), 01-04. <https://doi.org/10.51903/community.v3i2.349>
- IPGRI. (1996). *Descriptors for Coffee (Coffea spp. and Psilanthus spp.)*. International Plant Genetic Resources Institute.
- Irwanti, S. (2017). Coffee shops and the modern lifestyle. (In Indonesian.). *Jurnal Al-Khitabah*, 3(1), 33-47.
- Kurnia, S., Ropalia, R., & Zasari, M. (2023). Morphological characterization of small holder plantations in Bangka Island. (In Indonesian.). *Jurnal Agro Industri Perkebunan*, 11(2), 115-132. <https://doi.org/10.25181/jaip.v11i2.2717>
- Lumbanraja, P., Pandiangan, S., & Pelawi, K. P. (2021). Light intensity and NPK dosage determine the growth of arabica coffee (*Coffea arabica* L.) seedlings plant. (In Indonesian.). *AGRIUM: Jurnal Ilmu Pertanian*, 24(2). <https://doi.org/10.30596/agrium.v24i2.8191>
- Mudjiyanto, B. (2018). Exploratory research in communication study. (In Indonesian.). *Jurnal Studi Komunikasi Dan Media*, 22(1), 65-74.
- Mulyana, S. Achmad, R. Levana, A. (2017). *Analysis of potential land suitability for arabica and robusta coffee plantations in Bandung district* [Bachelor's Thesis, Winaya Mukti University]. Repository of Winaya Mukti University. <https://repository.unwim.ac.id/file/mahasiswa/381144852.pdf>
- PPID Pandeglang. (2019). *Information and Documentation Services Report*. Information and Documentation Management Officer (PPID) Pandeglang Regency. <https://ppid.pandeglangkab.go.id/home/documenppid>
- Prastowo, E., & Arimarsetiowati, R. (2019). Morphological variations of robusta coffee as a response to different altitudes in Lampung. *Pelita Perkebunan*, 35(2): 103-118. <https://doi.org/10.22302/iccri.jur.pelitaperkebunan.v35i2.378>
- Purwanto, E. H., Rubiyono, R., & Towaha, J. (2015). Quality and organoleptic characteristics of clones BP \$2, BP 358 and BP 308 robusta coffee from Bali and Lampung. (In Indonesian.). *SIRINOV*, 3(2), 67-74.
- Rusandi, R., & Rusli, M. (2021). Designing basic/descriptive qualitative research and case studies. (In Indonesian.). *Al-Ubudiyah: Jurnal Pendidikan dan Studi Islam*, 2(1), 48-60. <https://doi.org/10.55623/au.v2i1.18>
- Sakiroh, S., & Ibrahim, M. S. D. (2020). Morphological, anatomical, and physiological characterization of seven superior clones of robusta coffee. (In Indonesian.). *Jurnal Tanaman Industri Dan Penyegar*, 7(2), 73-82.
- Satibi, M., Nasamsir, N., & Hayata, H. (2019). Rorak creation in arabica coffee plantations (*Coffea arabica*) to increase productivity. (In Indonesian.). *Jurnal Media Pertanian*, 4(2), 74-80. <https://doi.org/10.33087/jagro.v4i2.85>
- Septiani, B. A., Kawuryan, I. S. S. (2021). Analysis of the causes of the decline in robusta coffee production in Temanggung Regency. (In Indonesian.). *EKUITAS: (Jurnal Ekonomi Dan Keuangan)*, 5(3), 365-388.
- Sulistiani, R., Barus, W. A., Utami, S., & Alparizi, R. (2023). Adaptation of morphology and physiology of coffee seedlings in lowlands. (In Indonesian.). *AGRIUM: Jurnal Ilmu Pertanian*, 26(2), 168-179. <https://doi.org/10.30596/agrium.v26i2.16629>
- Tarigan, E. B., & Towaha, J. (2017). Effect of fruit maturity, bean fermentation, and roasting time on physico-chemical characteristics of robusta coffee. (In Indonesian.). *Jurnal Tanaman Industri dan Penyegar*, 4(3), 163-170.
- Widayani, D. P., & Usodri, K. S. (2020). Land suitability assessment of smallholder coffee plantations on the slopes of Mount Arjuna, Malang Regency. (In Indonesian.). *Jurnal Agrinika: Jurnal Agroteknologi dan Agribisnis*, 4(2), 108-118. <https://doi.org/10.30737/agrinika.v4i2.1036>
- Zasari, M., Kartika, K., & Altin, D. (2023). Exploration-morphological characterization of local robusta coffee in Bangka Island. (In Indonesian.). *Jurnal Agrikultura*, 34(2), 200-209. <https://doi.org/10.24198/agrikultura.v34i2.43179>

Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher(s) and/or the editor(s).

Copyright: © 2024 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).