*Jurnal Lahan Suboptimal : Journal of Suboptimal Lands*
*ISSN: 2252-6188 (Print), ISSN: 2302-3015 (Online, www.jlsuboptimal.unsri.ac.id)*
*Vol. 13, No.1: 1-8 April 2024*
*DOI: 10.36706/JLSO.13.1.2024.674*

# Physical and chemical of soil properties area coffee in Several Banjar Villages, Bangka Regency

*Sifat fisik dan kimia tanah pada areal tanaman kopi rakyat di beberapa Desa Kabupaten Bangka*

**Ratna Santi[*)], Nyayu Siti Khodijah, Siti Cahyani**
Agrotechnology, Faculty of Agriculture, Fisheries and Biology, Bangka Belitung University, Pangkalpinang 33125, Bangka Belitung Island, Indonesia

[*)]Corresponding author: ratnasanti533@gmail.com. Tel.: +62-812-6162-9453

(Received: 12 January 2024, Revision accepted: 26 March 2024)

**Citation:** Santi, R., Khodijah, S. N., Cahyani, S. (2024). Physical and chemical of soil properties area coffee in Several Banjar Villages, Bangka Regency. *Jurnal Lahan Suboptimal : Journal of Suboptimal Lands. 13* (1): 1-8. https://doi.org/10.36706/JLSO.13.1.2024.674.

## ABSTRAK

Tanaman kopi merupakan salah satu komoditas perkebunan rakyat di kabupaten Bangka, selain lada dan karet. Luas kebun kopi rakyat di kabupaten Bangka seluas 302.879 Ha dengan total produksi dari 39,05 Ha sebanyak 3 ton. Sebaran kebun kopi rakyat terutama terdapat di desa Riding Panjang, Deniang, Desa Air Duren, Petaling Banjar dengan produksi kopi berfluktuasi setiap tahun. Kebun kopi yang dikelola Masyarakat terdapat Sebagian tanaman yang sudah menghasilkan dan sebagian tanaman belum menghasilkan. Pertumbuhan dan produksi tanaman dipengaruhi oleh kondisi tanah dan iklim. Penelitian ini bertujuan untuk mengetahui karaktersitik sifat fisik dan kimia pada tanaman kopi yang ada di empat Desa Kabupaten Bangka. Metode penelitian menggunakan survei pengamatan pengukuran di lapangan dan analisis sampel di laboratorium. Pengambilan sample tanah dilakukan dengan cara metode acak diagonal. Sample tanah diambil di tiap empat titik lokasi penelitian. Sifat kimia tanah hasil analisis di laboratorium ICBB Bogor meliputi pH dan ketersediaan hara tanah. Pengamatan biofisik tanah yang dilakukan meliputi jenis warna tanah, tektur, bulk density, porositas tanah, drainase, kedalaman efektif perakaran. Berdasarkan sifat kimia dan fisik yang dianalisis kondisi tanah di areal pertanaman kopi tergolong masam dengan ketersediaan hara, kapasitas tukar kation rendah dan tekstur lempung liat berpasir dengan porositas rendah.

Kata kunci: karakteristik, kebun, lahan, tanaman

## ABSTRACT

Coffee plants are one of the plantations commodities in Bangka district bisides from pepper and rubber. The area of coffee plantations in Bangka district was 302,879 Ha with total production from 39.05 Ha of 3 tons. The distribution of community coffee plantations was mainly in the villages Riding Panjang, Deniang, Petaling Banjar, Air with coffee production fluctuating every year. Community managed coffee plantations contain some mature plants and some immature plants. Plant growth and production are influenced by soil and climate conditions. The research aimed to determine the physical and chemical characteristics of coffee plants in four Villages of Bangka Regency. The research method uses survey observation measurements in the field and sample analysis in the laboratory. Soil samples were taken using the diagonal random method. Soil samples were taken at each of the 4 location reseach. Soil chemical properties resulting from analysis at the ICBB Bogor laboratory include pH and soil nutrient availability. Soil biophysical observations carried out include soil color, texture, bulk density, soil porosity, drainage,effective rooting depth. Based on the chemical and physical properties analyzed, the soil condition in the coffee planting area was classified as sour with nutriens availability, low cation exchange capacity and a sandy clay loam texture with low porosity.

Keywords: characteristics, gardens, land, plants

## INTRODUCTION

Economically, the coffee plant is a plantation crop commodity that earns foreign exchange for Indonesia. One of the provinces that is developing coffee plants is the Bangka Belitung Islands. Bangka Regency is one of the districts that is quite extensive in developing people's coffee plantations in the Bangka Belitung Islands. The total area of people's coffee plantations was 13.8 ha in 2020 and increased to 39.05 ha in 2021 (BPS, 2022). Plantations are spread across the districts of West Mendo, Puding Besar, Bakam, Belinyu, Sungailiat, Pemali, and Riau Silip.

Increasing forest conversion into coffee plantations has a negative impact on soil quality if management does not meet recommended standards. The initial process of forest conversion is carried out by conventional land clearing, with soil physical aspects posing long-term risks, namely decreasing land productivity and environmental pollution (Amran et al., 2020). A decrease in land quality will be followed by a decrease in plant growth so that coffee productivity is still relatively low.

Soil quality indicators are the properties and characteristics or physical and chemical processes of soil that can describe soil conditions. Soil components consisting of solid materials, water and air are the main natural resources that greatly influence life (Tamara et al., 2020). Soil physical properties vary greatly and change easily in tropical soils. The physical properties of soil can change with soil processing, including soil temperature, soil permeability, sensitivity to surface flow (run-off), erosion, soil structure, and the ability to bind water for plants in soil pores.

The physical properties of soil can influence the chemical and biological properties of soil. The physical characteristics of the soil influence the growth and development of plants. The first function of soil as a growing medium is as a place for roots to find space to penetrate both horizontally and vertically. The better the physical properties, the better the chemical and biological properties will be. The physical properties of soil are characteristics that influence the growth and development of plants looking for space to penetrate both horizontally and vertically (Wulandari et al., 2015). The ability of soil as a growing growing medium can be optimal if it is supported by balanced physical, chemical and biological conditions of the soil based on the level of soil fertility (Alifiyah et al., 2020). According to Hardjowigeno (2015) the physical properties of soil will differ from one place to another. This is differentiated by several soil-forming factors, namely climate, parent material, organisms, topography and time.

Components of soil fertility that characterize soil chemical properties are pH, base cation exchange capacity, availability of macro nutrients and C-Organic content. Clay and organic matter are two active colloidal forms of soil which play a role in absorbing and exchanging cations in the soil. Cation exchange capacity (CEC) of soil is the ability of soil colloids to absorb and exchange cations. Soil CEC can be influenced by soil texture and soil organic matter content. Soil with a high CEC is able to absorb and exchange, providing better nutrients than soil with a low CEC (Putri et al., 2020).

Based on surveys on community-managed coffee plantations, there are immature plants and mature plants. The selected locations were 4 villages in Bangka Main district that develop coffee plants. Based on observations of the microclimate at the research location, the average soil temperature is between 32.80C to 34.40C. Dry soil moisture, average air temperature 340C to 370C with average air humidity 71-78%.

The objective of this research was to determine the chemical and physical properties of soil in coffee planting areas in the villages of Petaling Banjar, Air Duren, Deniang and Riding Panjang, Bangka district. The results of the research can provide information on chemical and physical characteristics, recommendations for improving the soil quality of farmers' coffee plantations in Bangka district in particular.

## MATERIALS AND METHODS

### Preparation

The research method used was a survey through observation in the field and analysis in the laboratory. The research was carried out from March 2021 to August 2023 in Petaling Banjar Village, Air Duren, West Mendo District and Riding Panjang Village, Deniang, Belinyu

District, Bangka Regency. Determination of location using purposive sampling technique. The selection of research locations was based on purposive sampling by looking at the area of the garden, age of the plants and production. The research location for soil sampling was at point 1042'08.5"S, 105045'57.1"E (Riding Panjang); 1045’29.3”S, 1-6004’27.6”E (Deniang); 2004’59.8”S, 106000’21.8”E (Air Duren); and 2007’18.5”S, 105059’33.7E (Petaling Banjar). The tools and materials used in this research were GPS, mineral soil drill, sample ring, field knife, soil moisture, stationery and laboratory equipment. The materials used were disturbed and undisturbed soil samples.

**Implementation**

The soil sampling technique was determined using the simple random sampling method and the composite method (BBBSDLP, 2009). Soil sampling in this study took five soil samples at each location per unit area of coffee planting area. Composite soil samples were taken from each location at a depth of 40 cm and 60 cm from the ground surface. Soil sampling was carried out in conditions where the soil samples were intact and undisturbed using a ring sample. Taking samples of disturbed soil using a mineral soil drill. The distance for taking soil samples was ± 2 meters with a location area of 1.5 hectares. Soil samples will be used for analyzing the physical and chemical properties of soil in the laboratory (Table 1).

Soil analysis was carried out in the laboratories of the Faculty of Agriculture, Fisheries and the Faculty of Engineering, Bangka Belitung University and the Indonesian Center for Biodiversity and Biotechnology (ICBB) Laboratory, Bogor. Soil analysis was carried out to determine the properties of the soil at the research location. The soil analysis method was based on the technical instructions for the Soil, Plant, Water and Fertilizer Chemical Analysis Book (BBBSDLP, 2009).

**Data Analysis**

The data collected was in the form of primary data on the physical characteristics of the land and secondary data in the form of climate data and the history of land management. Data from laboratory analysis in the form of characteristics of the physical and chemical properties of soil in people's coffee plantation areas in four villages of Bangka district were presented in the form of narratives and tables. There were differences in the physical and chemical characteristics of the soil at the four research locations. Based on measurements of the chemical and biophysical properties of soil in the field, it was found that the soil content was different at the two research locations.

Table 1. Parameters and methods of physical and chemical analysis of the soil tested

| Parameter | Unit | Measurement Method |
|---|---|---|
| Soil pH | pH $H_2O$ | Potentiometry |
| C-organic | % | Walkley & Black |
| N Total | % | Kjeldahl |
| P2O5 was available | Mg/kg | Bray I |
| K2O can exchange | cmol/kg | 25% HCl extraction |
| KTK | cmol/kg | 25% HCl extraction |
| Fill weight | $g/cm^3$ | gravimetry |
| Porosity | % | Totally saturated |
| Permeability | cm/jam | Comparison of weight and texture |
| Water content | % | gravimetry |
| Texsture | % fraksi | Pipette method |
| Effective depth | cm | Excavation |
| Drainase | - | Field observation of drainage class |
| Biophysical conditions/profile of the research area | - | GPS, Survey, secondary data |

## RESULTS

There were differences in the physical and chemical characteristics of the four coffee plantation research locations in Bangka Regency. The results of the analysis in the form of characteristics of the physical and chemical properties of the soil in the people's coffee plantation area in 4 villages of Bangka district were presented in Tables 2 and 3 below.

### Chemical Properties of Soil in Coffee Plantations at Research Locations

The pH conditions at all research locations have acid pH criteria. Based on the results of soil analysis at the research location, acid conditions dominate with an average value below 5.5. The lowest pH value was obtained from the durian water location, namely 4.4 and the highest at the Deniang location, 5.2 (Table 2).

Organic C levels at each research location vary. The results of organic C analysis at the research location show that the organic C content falls into the criteria of low to very high. The highest C-organic value was found at the durian water location, namely 5.4% and the lowest at the other 3 locations, namely below 2%. Characteristics for total N values using the Kjehdahl method show very low to low nitrogen content with values between 0.07–0.29%. The N content at the Air Duren location was slightly higher than the other 3 locations, namely 0.29% with the status category still low.

Based on the results of the P nutrient analysis, Bray II was in low to very high P nutrient status. The highest P nutrient content was found at the Petaling Banjar location, namely 150.78 mg/kg and the lowest at the Air Duren location, namely 6.39 mg/kg.

The cation exchange capacity was low status for the Petaling Banjar and Deniang locations, namely an average of below 5-16 Cmol (+)/kg. The status of cation exchange capacity for the Riding Panjang and Air Duren locations was that the cation exchange capacity was medium, namely an average of 17-24 Cmol (+)/kg. Exchange of base cations Ca+, Mg+, Na+ and K+ Based on the results of analysis of base cations at all other locations, the lowest value was < 0.029 Cmol (+)/kg for Na+ and the highest was 0.21 for Mg+. The criteria for the cation status of exchangeable bases were very low, namely below < 0.1.

Table 2. Results of soil chemical character analysis at 4 research locations

| Parameter | Unit | Riding Panjang | Petaling Banjar | Air Duren | Deniang |
|---|---|---|---|---|---|
| pH H2O | - | 4.9 | 4.7 | 4.4 | 5.2 |
| C-Organic | % | 2.09 | 1.18 | 5.44 | 1.68 |
| N total | % | 0.18 | 0.07 | 0.29 | 0.12 |
| P-Bray | Mg/kg | 25.72 | 150.78 | 6.39 | 9.76 |
| K-dd | Cmol(+)/kg | 0.14 | 0.03 | 0.09 | 0.08 |
| Na-dd | Cmol(+)/kg | 0.11 | 0.07 | 0.05 | 0.04 |
| Ca-dd | Cmol(+)/kg | 0.57 | < 0.49 | < 0.49 | < 0.49 |
| Mg-dd | Cmol(+)/kg | 0.08 | 0.05 | 0.07 | 0.21 |
| KTK-dd | Cmol(+)/kg | 19.64 | 6.39 | 21.01 | 6.32 |

Information: -dd = base cations can be exchanged
Source: Analysis results at the ICBB Bogor Laboratory (2023).

Table 3. Results of analysis of soil physical characteristics at 4 research locations

| Parameter | Unit | Riding Panjang | Petaling Banjar | Air Duren | Deniang |
|---|---|---|---|---|---|
| Texture | % sand | 76 | 49 | 59 | 73 |
| | % clay | 42 | 17 | 34 | 25 |
| | % dust | 9 | 7 | 7 | 2 |
| Fill weight | $g/cm^{-3}$ | 1.15 | 1.5 | 1.3 | 1.3 |
| water content | % | 2.06 | 2.37 | 2.19 | 2.06 |
| Porosity | % | 41 | 26 | 32 | 42 |
| Permeability | cm/jam | 0.36-3.6 | 3.6-36.0 | 0.36-3.6 | 0.36-3.6 |
| Effective Depth | cm | 30 | 42 | 30 | 31 |
| Drainase | - | Homogen without spots/good | Homogen without spots/good | Homogen without spots/good | Homogen without spots/good |

**Physical Properties of Soil in Coffee Plantations at Research Locations**

The results of the research showed that the physical properties of soil in coffee plantations vary in the parameters of soil texture, bulk density, porosity, soil color and effective soil depth. The research data shows that the average weight of mineral soil was 1.15–1.53 cm (Table 3). The organic carbon content of the soil will influence the specific gravity of soil particles at the research location.

Observation of the profile of each soil horizon shows that the color of the soil at the location was predominantly brown with various color gradations. The gradation of soil color at the Petaling Banjar location was 2.5Y/7/3 Pale Yellow (horizon O), 2.5Y/8/8 Yellow (horizon A) 2.5Y/6/8 Olive Yellow (horizon B); Deniang 10 YR/5/3 Brown (horizon O), 10 YR//4/6 Dark Yellow Brwon (A), 10 YR/4/6 Dark Yellow Brwon (horizon B); Riding Length 1 7.5YR/5/8 Strong Brwon (horizon O), 7.5 YR/3/4 Dark Brown (horizon A), 7.5YR/6/6 Reddish Yellow (horizon B) and Air Duren 5Y/2.5/1( horizon O), Black 5Y/4/1 Dark Gray (horizon B) and 2.5Y/5/6 Light Olive Brown (horizon B). Based on the distribution map of soil types in Bangka Regency, the types were included in the Hapludults soil order sub-group.

The results of physical analysis of soil samples taken at a depth of 40-60 cm showed that they had varying texture classes. Based on the soil texture class at the research location, it was included in the sandy clay loam class at the Petaling Banjar, Air Duren and Deniang locations. Meanwhile, the Riding Panjang Area has a sandy clay texture. The fraction content was sequentially 49-76% sand, 17-42% clay and 2-9% dust (Table 3).

The water content at the research location ranged from 2.06-2.37%. Based on the calculation of the comparison of texture and bulk density, it was found that the soil permeability at the research location was ± 0.36-36 cm/hour (Table 3). The consistency of the soil at the research location was sticky wet, slightly plastic, partly moist, loose soil, lumpy and loosely dry.

The results of soil solum measurements at the soil research location were less than 60 cm. The effective depth of the research site was based on excavation by observing the spread of coffee plant roots. Soil solum at all research locations falls into the category of shallow effective depth, which ranges from 30-42 cm (Table 3). The research location was at an altitude of approximately 60 meters above sea level with plains and some gentle slopes with slopes below 8-15%.

## DISCUSSION

Plant growth is influenced by genetic and environmental factors. The limiting environment for plant growth consists of climate and soil, namely the properties of the soil as a planting medium. Soil reactions indicate the acidity and alkalinity of the soil which are expressed by pH. The importance of soil pH determines whether or not nutrients are easily absorbed by plant roots. Nutrients are easily absorbed by roots at a soil pH around neutral and dissolve easily in water.

The dominant condition of soil acidity is high, pH below 5.5 (Table 2) in all research locations because the soil type in Bangka district is predominantly of the yellowish brown Podzolic association type with a complex parent material of Quartzite Sandstone and Sour Plutonic Stone. Some other areas consist of alluvial association soil types and light gray regosol derived from sand and clay deposits (BPS, 2022).

In line with the research results of Margolang et al. (2015) conventional farming systems using urea fertilizer will acidify the soil. The use of organic materials can stabilize soil pH and increase soil K exchange. Simanjuntak & Hendrawan (2022) added that low soil pH values are influenced by the level of weathering of the parent material at the research location, the leaching of alkaline cations and the presence of aluminum metal. Baihaqi et al. (2022) stated that soil acidity can be caused by the concentration of hydrogen ions in the soil solution, liming activity and high intensity rainfall which causes bases to be leached.

Nutrient elements that support plant growth include total nitrogen, phosphorus, available calcium and magnesium. Nutrients are absorbed by plants in the form of cations and anions. Base cations are ions that have a positive charge such as Ca+, Mg+, K+, Na+, and so on. cations

dissolved in ground water or adsorbed by soil colloids. The results of soil analysis indicate the potential for leaching of alkaline cations at all research locations.

Baihaqi et al. (2022) stated that carbon levels are influenced by the weathering process of organic material on the soil surface in the A horizon which is characterized by dark colors at all research locations. Carbon levels are also influenced by the level of land management, soil depth and height of the soil surface. Increases in organic carbon and total soil nitrogen can come from the mineralization of organic materials applied in organic farming systems (Margolang et al., 2015). According to Siahaan & Kusuma (2021), land use type influences organic carbon levels at different soil depths. Differences can be caused by differences in plant vegetation stands and land processing which will affect the input of soil organic matter.

The organic C value at the Air Duren research location is high because at the observation location there is a diversity of plant types, density of rubber and coffee plants and there is the addition of fertilizer, plant and animal waste (Table 2). According to Simanjuntak & Hendrawan et al (2022), the low nitrogen is thought to be because nitrogen is lost through leaching or evaporation that occurs at the research location. The nitrogen element in soil comes from the decomposition of organic matter, fertilizer and plant and animal remains.

The increase in P was due to the mineralization of organic P by adding organic material to the soil surface at the research location. The addition of organic matter can increase the available P content and the rate of Nitrogen mineralization in the soil. This is in line with the results that the P content in the Petaling Banjar location is higher than other locations when waste from chicken slaughtering is given.

P-Bray II P nutrient availability is very high in the Petaling Banjar and Riding Panjang locations due to treatments that increase phosphorus nutrients in the soil (Table 2). There is a periodic treatment of providing cow dung fertilizer in the Riding Panjang coffee planting area. Treatment of providing remaining chicken feather waste on the ground surface of the Petaling Banjar coffee area. Phosphorus in the form of organic molecules is an energy source stored in ATP and NADPH2. The physiological function of phosphorus is needed at the beginning of plant growth, root development, entering the primordia phase to the reproductive phase, especially seed formation.

Biological activity in terms of nitrogen nutrient availability and organic carbon content is still low to moderate. Soil organic matter is a variety of complex organic compounds that are or have undergone a decomposition process. The largest constituent of organic matter is organic carbon (C-organic). C-Organic indirectly indicates the presence of organic matter in the soil. Organic matter content is also an indicator of soil fertility levels (Gunawan et al., 2019). Nitrogen has a physiological function for plant growth. Most of the nitrogen is the result of the decomposition of organic materials. Conversion of complex nitrogen compounds into simple compounds through the oxidation of nitrate through the nitrification process by bacteria.

Most of the research locations fall into the sandy clay loam texture class for the Petaling Banjar, Deniang and Air Duren locations. The soil at the research location has a clay texture with rather fine particles, causing the pore space to not be large, resulting in the potential for soil compaction. Bulk density is an indication of soil density. The denser the soil, the higher the bulk density, making it difficult for water to penetrate plant roots (Tarigan et al., 2014). Bulk weight is the weight of the soil mass in field conditions that is oven-dried per unit volume Hardjowigeno., 2015). According to (Amran et al., 2020) the volume weight of soil varies due to variations in soil organic matter content, texture, structure, type of soil clay minerals, plant rooting depth and type of soil fauna.

Soil has varying primary particle sizes and can be grouped into sand, dust and clay particles. Soil texture will also influence soil processing activities, aeration and soil fertilization (Utomo et al., 2016; Asril et al., 2022). Soil texture influences the rate of infiltration into the soil, water storage in the soil, soil processing and soil aeration. Mineral soil has a texture that varies with each type of soil and soil depth (Utomo et al, 2016). According to Annisa and Prijono, (2023), the level of soil density is determined by the amount of pore space. According to (Purba et al.,

2021), soil compaction will affect plant roots and the soil water content will become low.

Based on the class division, permeability is included in the medium class, namely with a value of ±1.25 - 5.0 mm/hour (Table 3). Slow permeability causes water flow to be hampered, potentially hampering the movement of nutrients to plant roots. Handi et al., (2023) informed that the level of soil bulk weight influences the lower rate of groundwater movement due to an increase in micro pore space. High or low permeability of a soil is influenced by the pore size and the connections between the soil pores. Soil with large pores has good connections between the pores, so water will easily flow into the soil. Small soil pores with uniform inter-pore connections will have lower permeability, so that water will flow more slowly (Utomo et al., 2016). The water infiltration system will affect the stability of the slope surface, both on original soil and engineered soil (Widiasmadi, 2020).

The results of observations of soil drainage in the coffee plantation area show that the drainage class is predominantly medium. Soil with a sandy loam texture has a better effect on improving drainage, aeration and ease of tillage than soil dominated by clay. Proper soil management, permeability and water availability will influence drainage for the better (Sulaeman et al., 2016; Hosseini et al., 2016).

Soil with steep slopes absorbs less water and causes reduced root growth. On the other hand, soil with flat slopes is able to hold more water and be absorbed by the roots so that root growth is better (Alfiyah et al., 2020). Based on the effective depth, soil is divided into 6 classes, namely very deep (> 150 cm), deep (100-150 cm), medium (50-100 cm), shallow (30-50 cm), very shallow (10-30 cm), very shallow (< 10 cm).

A gardening system using conventional forest land clearing by felling and burning. One of the impacts that occurs is the reduction in the layer of organic material as a source of nutrients. Reduced vegetation cover and high rainfall result in a high potential for leaching of alkaline cations. Soil texture analysis shows that the soil is dominated by sand particles, while dust and clay are low. The clay and dust fractions play a role in the cation exchange process, binding water and nutrients. The potential for leaching of nutrients in sandy soil is higher than in clay soil. The high C-Organic content in Air Duren coffee plantations is because the coffee plantation area is located between rubber plantations that are still producing. High humidity, lower temperatures and proximity to river water sources cause the accumulation of more organic material and the weathering of fresh organic material. Based on observations, the growth of coffee plants in the Air Duren and Petaling Banjar locations is better than in Riding Panjang and Deniang.

Based on surveys, most coffee plant fertilization is not carried out regularly and tends to depend on the economic conditions of farmers. Plant maintenance in the field is irregular, where the plant area is overgrown with grass and weeds. The planting pattern system for large areas is carried out using an intercropping pattern with vegetable crops (annuals). Poor land management causes low soil fertility. Low soil quality causes low community coffee productivity. Land improvement can be done by adding macro fertilizers, organic materials and improving drainage on coffee fields.

## CONCLUSION

The characteristics of the soil in four villages in the community coffee planting area in Bangka district generally have a low fertility level. Based on the results of measuring the parameters of the soil properties of the coffee plantation at the research location, it has a sandy clay loam texture with a fine to coarse texture, the soil color is yellowish to brown with a pH condition that is classified as acidic. The soil depth is relatively shallow with an average organic carbon content of low to medium.

## ACKNOWLEDGEMENTS

The author expresses his thanks to Bangka Belitung University for research funding through the Accelerated Research Scheme in 2023.

### REFERENCES

Alfiyah, F., Nugroho, Y., Rudy, G. S. 2020. The influence of slope class and land cover on soil solum, effective root depth and soil pH. *Jurnal Sylva Scienteae*, *3*(3), 499-508. https://doi.org/10.20527/jss.v3i3.2183

Amran, H. A. 2020. Analysis of soil physical quality index on people's oil palm (*Elaeis guineensis* Jacq.) plantations in Nagari Gunung Selasih, Pulau Punjung Dharmasraya District. *Skripsi*. Andalas University, Padang.

Asril, M., Nirwanto, Y., Purba, T., Rohman, L. M. H. F., Siahaan, A. S. A., Junairiah, E. S., Sa'adah, T. T., Sudarmi, T. N., Mahyati, Mazlina. 2022. *Geology*. Medan : Yayasan Kita Menulis.

Annisa, D. W., Prijono S. 2023. Analysis of soil saturated hydraulic conductivity in various types of shade on people's coffee fields in Sumber Manjing Wetan District. *Journal of Land and Land Resources*, *10*(1), 15–23. https://doi.org/10.21776/ub.jtsl.2023.010.1.2

Baihaqi, M. H., Rayes, M. L., Agustina, C. 2022. Study of Soil Characteristics on the Level of Productivity of Upland Land in Supiturung Micro Watershed, Kediri Regency. *Journal of Land and Land Resources*, *9*(1), 69-81. https://doi.org/10.21776/ub.jtsl.2022.009.1.8.

BBSDLP. 2006. *Physical properties of soil and methods of analysis*. Bogor : Balai Besar Sumber Daya Lahan Pertanian.

[BPS]. Badan Pusat Statistik. 2022. Kabupaten Bangka dalam Angka 2022.

Gunawan, Wijayanto N, Budi SWR. 2019. Characteristics of soil chemical properties and soil fertility status in *Eucalyptus* sp-based vegetable agroforestry. *Journal of Tropical Silviculture*, *10*(2), 63-69.

Hardjowigeno, S. 2015. *Geology*. Jakarta : Akademika Pressindo.

Margolang, R. D, Jamilah, M., Sembiring, M. 2015. Characteristics of several physical, chemical and biological properties of soil in organic farming systems. *Agrotechnology Online Journal*, *3*(2), 717-723.

Purba UM, Toekidjo, Prajitno J. 2021. Productivity of Arabica Coffee (*Coffea arabica* L.) of the People in Raya District, Simalungun Regency. *Journal of Vegetalica*, *1*(2), 67–77. https://doi.org/10.22146/veg.1520

Putri, O. H., Utami, S. R., Kurniawan, S. 2019. Soil Chemical Properties in Various Land Uses in UB Forest. *Journal of Soil and Land Resources*, *6*(1), 1075-1081. https://doi.org/10.21776/ub.jtsl.2019.006.1.6.

Siahaan, R. C,, Kusuma, Z. 2021. Characteristics of Soil Physical Properties and C-Organics in Different Land Uses in the Ub Forest Area. *Journal of Soil and Land Resources*, *8*(2), 395-405. https://doi.org/10.21776/ub.jtsl.2021.008.2.11

Simanjuntak, D. S., Hendrawan, B. 2022. Characteristic Analysis of Soil Chemical Properties in Pabatu Serdang Bedagai Unit Oil Palm Plantations. *Research Journal*, *2*(2), 549-553. https://doi.org/10.58939/afosj-las.v2i2.318

Sulaeman, S., Rajamuddin, U. A., Isrun. 2016. Soil Quality Assessment in Several Types of Land Use in Sigi Biromaru District, Sigi Regency. *E-Journal Agrotechbis*, *4*(6), 712–718.

Tamara, W. R., Sumiyati, S., Wijaya, I. M. A. S. 2020. Quality Analysis of Soil Physical Properties on Subak Land in Bali. *BETA Journal (Biosystems and Agricultural Engineering)*, *8*(2), 358-363. https://doi.org/10.24843/jbeta.2020.v08.i02.p21.

Tarigan, E. S., Guchi, H., Marbun, P. 2014. Evaluation of the Status of Organic Matter and Physical Properties of Soil (Bulk Density, Texture, Soil Temperature) on Coffee Planted Lands (*Coffea* Sp.) in Several Districts of Dairi Regency. *Journal of Agroecotechnology, University of North Sumatra*, *3*(1), 103-124. https://doi.org/10.32734/jaet.v3i1.94.

Widiasmadi, N. 2020. Drainage methods for slope stability of agricultural land. *Journal of Agricultural Sciences. Mediagro*. Wahid Hasim University. 3(1): 21-39. http://dx.doi.org/10.31942/mediagro.v3i1.538.

Wulandari, N., Hermiyanto, B., Usmadi. 2000. Analysis of Soil Quality Index Based on Physical Properties in Na-Oogst Tobacco Planting Areas and Their Relationship with Na-Oogst Tobacco Productivity in Jember Regency. *Agricultural Scientific Periodical Bulletin, X*, 1–6.