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THE STUDY OF SOME PHYSICAL PROPERTIES OF ANDISOLS IN VARIOUS LAND IN JERNIH JAYA VILLAGE, GUNUNG TUJUH DISTRICT, KERINCI REGENCY

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ABSTRACT

Although Andisols is the best soil type to support plant growth, overuse of Andisols soil type can degrade soil quality. Gunung Tujuh District of Kerinci Regency's Jernih Jaya Village, there is an Andisols land use location. Soil quality is negatively impacted by land management practices, which disregard land sustainability, soil, and water conservation measures. To understand the physical characteristics of Andisolss in various land uses in Jernih Jaya Village, it is vital to examine the effects of different tillages and land uses. The stages were (1) preparation of primary data (taking soil samples) and secondary data (making maps), (2) survey (preliminary survey and main survey), (3) data processing and interpretation of data resulting from analysis of soil samples and surveys. Based on an examination of various physical attributes of Andisols in different land used within Jernih Jaya Village, Gunung Tujuh District, Kerinci Regency, it could be inferred that the physical properties of Andisols were deemed favorable. The results indicated that the area was used for vegetables, plantations, secondary forests, and paddy fields, with slope classes ranging from 0-3%, 3-8%, and 8-15%, sandy loam with a crumb structure in all land used, high water content, moderate to high total pore space, low to medium volume weight, and high organic matter were all present. When compared to other land uses, paddy fields had the highest organic matter content (22.10%), highest moisture content (124.89%), highest total pore space (79.39%), and lowest bulk density (0.57 g/cm^3).

Keywords: *Andisols, Kerinci, Land Use, Soil Physics, Surveys*

INTRODUCTION

As a tropical country with two distinct seasons, drought and rain, most of the population lives from agriculture. Indonesia is an agricultural nation. The agricultural land has experienced much degradation, reducing soil quality and affecting land productivity. Good soil quality will support the function of the soil as a medium for plant growth, divide water flow, and maintain a suitable living environment.

Around volcanoes, the soil is typically more fertile and dominated by the Andisols Order, which has a sandy loam texture, a high organic matter content, a black or brown color, friability, and a slippery surface (Hardjowigeno, 2003). Andisols can be found in various lowlands and are often discovered at elevations between 750 and 3,000 meters above sea level (masl). They feature a humid tropical climate with 2,500–7,000 mm annual rainfall (Hikmatullah & Nugroho, 2010). Furthermore, Andisols have good chemical qualities; they have a pH that ranges from slightly acidic to neutral (Handayani, 2015), and they have not weathered significantly, allowing them to store nutrients (Anda & Sarwani, 2012).

World Resources Institute (2012) The conversion of forest functions causes the land to undergo a process of degradation, the logging of trees that have carbon content, low biodiversity conditions, Burhanuddin (2010), and intensive soil cultivation which has an impact on reducing the physical properties of the soil which include permeability, aggregation, compaction, soil porosity and harms the distribution of soil pores. Damage to soil aggregates that occurs hurts soil permeability, which can result in low infiltration and percolation rates.

Variances in land management practices lead to distinctions in the physical characteristics of the soil. Soil subjected to conservation tillage exhibits superior properties to soil that has undergone continuous intensive tillage for approximately 15 years (Jambak, Baskoro, & Wahjunie, 2017). Andisols are employed for various land uses, including Jernih Jaya Village in the Gunung Tujuh

District of Kerinci Regency. Despite the significance of data related to this soil type, limited research has been conducted in this location. Land management in Jernih Jaya Village does not consider land sustainability and soil and water conservation methods. Commodities developed include coffee, cinnamon, oranges, cabbage, chilies, potatoes, and horticultural crops. In addition to obtaining optimal results, economic demands are also the reasons that drive these diverse land uses. Farmers use inorganic fertilizers and combine inorganic fertilizers and organic fertilizers. Different land uses and tillage certainly have different impacts on the physical properties of the soil. Hence, it is essential to investigate several physical characteristics of Andisols across diverse land uses in Jernih Jaya Village, Gunung Tujuh District, Kerinci Regency. This study aims to promote proper land utilization and mitigate potential land degradation.

METHOD

A. Time and Location

The study was in Jernih Jaya Village, Gunung Tujuh District, Kerinci Regency, from January to March 2022. The Soil Fertility Laboratory at the Universitas Jambi's Faculty of Agriculture conducted soil analysis.

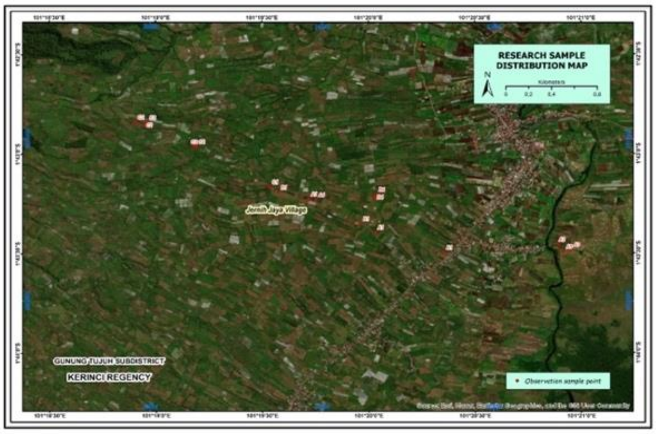

Figure 1. Research Work Map

B. Materials

The materials were undisturbed soil samples, disturbed soil samples, administrative village boundary maps, soil type maps, land use maps, work maps, and slope maps. The tools used during the study were sample rings, abney level, hoes, cutter knives, boards, plastic bags, gallon lids, rubber bands, label paper, and ovens.

C. Methods

Purposive Random Sampling was applied to take soil samples. The land units map was made based on an overlay of land use, and the slope maps scaled 1:25,000. The scale of the land units map was 1:25,000 to produce homogeneous land units.

Table 1. Types, sources, and uses of data

Type of Data	Source of Data	Usability Data
Secondary Data		
Land Use Map	Google Earth image	Determination of sample points
Administration Map	In a geoportal and description of the village	Limits of research locations Determination of sample points
Slop Map	Derived from DEMNAS Data	
Work Map	*Overlay*	Guidelines for doing work while in the field
Land Map	BBSDLP	
Primary Data		
Whole Soil Sample	Research Site	Soil analysis: bulk density, Total Pore Space, Specific Gravity, Moisture Content
Disturbed Soil Sample	Research Site	Organik Matter, C-Organik

The research process comprises initial stages such as research preparation, preliminary and primary surveys, and subsequent phases like data analysis and interpretation. The materials used include several maps such as research location maps, soil types, land use types, and slopes. Superimposing slope maps and land use type maps prepared the working maps. The study area has several land use types, such as plantations, secondary forests, settlements, vegetable crops, and rice fields. Meanwhile, slope classes vary and are grouped into three groups, which are 0-3%, 3-8%, and 8-15%. The work map is generated by combining land use and slope maps to create uniform land units. Within these units, soil samples were collected at two distinct depths: 0-30 cm and 30-60 cm. Table 3 shows the sample points distribution.

Table 2. Homogeneous Land Units and Number of Sample Points

Slope	Land Use	Sample	Code	Area (ha)
0-3%	Vegetable Plants	2	A1	25,43
0-3%	Paddy field	3	A3	59,62
0-3%	Settlement	0	A5	0,56
0-3%	Plantation	1	A4	0,72
3-8%	Vegetable Plants	4	B1	106,53
3-8%	Settlement	0	B5	9,55
3-8%	Plantation	2	B4	17,51
8-15%	Vegetable Plants	1	C1	2,27
8-15%	Secondary Forest	4	C2	101,06
8-15%	Plantation	1	C4	1,15
Total		18		345,03

Source: Analysis Resul

Ring sample was used to take intact samples for water content and bulk density data while the c-organic and organic matter data were derived from disturbed soil at 0-30 cm and 30-60 m depth. Table 3 shows the parameters and techniques used in the laboratory. Samples of intact soil and disturbed soil are taken at each code.

Field examinations of the soil structure are performed to assess the dimensions and configuration of the soil structure. Using soil clumps at a designated depth, one can inspect the soil structure by applying pressure to the clumps with fingers on the palms until they coalesce into aggregates or a composite of aggregates. Subsequently, a magnifying glass is employed for close inspection, and a ruler is utilized for measuring the resulting formations.

Table 3. Parameters and Methods of Analysis of Soil Physical Properties in the Laboratory

Parameter	Unit	Method
Bulk Density	g/cm^3	Gravimetry
Total Pore Space	%	Gravimetry
Organic Matter	%	Dry Ashes
Water Content	%	Gravimetry

The soil physical properties data, derived from the analysis results, are subsequently interpreted descriptively, considering both land use and varying slopes. The information gathered yields the most accurate depiction of soil physical properties across diverse land uses.

FINDING AND DISCUSSION

A. Overview of Research Locations

The village possesses strengths in tourism, particularly renowned for the Rawa Bento tourism attraction in Jambi Province, along with a diverse range of agricultural commodities. Essential products in the agricultural sector revolve around plantation, horticulture, and food subsectors. Within the plantation subsector, Jernih Jaya Village specializes in prominent commodities such as coffee and cinnamon plants. Noteworthy items in the horticulture subsector include carrots, cabbage, red chilies, and shallots, while rice, sweet potatoes, and potatoes dominate the food subsector. Jernih Jaya Village has an average temperature of between 14° and 26°C and is situated at an elevation of ± 1,300 meters above sea level. It has a wet tropical climate with an average annual rainfall of 2,991 mm, relative air humidity between 77% and 92%, and Andisols soil type is dominant in the village area. The research was segmented into four distinct categories or uniform land units: forest land, plantation, paddy field, and horticultural land. The forest land use involves a secondary forest that develops from a primary forest, followed by selective cutting, resulting in dense vegetation of various types. Secondary forests are characterized by deep-rooted vegetation and a substantial amount of litter from leaves and twigs, contributing organic matter that enhances soil looseness.

B. Soil Texture and Structure in Various Land Uses

Soil texture is the fineness of the soil based on the ratio of the number of grains of sand, silt, and clay. Soil structure is the composition of primary soil particles (sand, silt, and clay) that form soil aggregates with one another, which are bounded by weak natural planes. The results of observations of soil texture and structure in various land uses are presented in Table 4.

Table 4. Soil Texture and Structure in Various Land Uses

Land Use	Slope	Depth (cm)	Soil Texture	Structure
Vegetable Plants	0-3%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
	3-8%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
	8-15%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
Secondary Forest	8-15%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
Paddy Field	0-3%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
Plantation	0-3%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
	3-8%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb
	8-15%	0-30	Sandy Loam	Crumb
		30-60	Sandy Loam	Crumb

Source: Analysis Result

Through field research, it was observed that the texture class remained relatively consistent, identified as sandy loam. The presumption is that the four land uses share a common origin from the same parent material and undergo an extended duration for alterations linked to the weathering process. Rosyidah and Wirosoedarmo (2013) state that the finer the soil texture, the smaller the porosity. Research shows that secondary forests, vegetable land, paddy fields, and plantations are relatively similar, namely crumb structures. It is presumably because the high content of soil organic matter can create conditions for the activity of microorganisms in the soil so that the decomposition of organic matter will produce the compounds needed in forming soil structure. Henny*, Nasution & Ridwan* (2023) The soil on the volcanic plateau of Mount Kerinci is dominated by Andisols, the most fertile mineral soil with high-very high organic matter (4-22.46 percent), low bulk density (0.37-0.90 g/cm3) due to the dominance of the amorphous mineral allophane). Andisols are sensitive to erosion because dust fractions generally dominate the soil texture, the topography is mostly sloping to mountainous (slope >3%), and rainfall is high. Therefore, erosion is the main problem when using andisols for seasonal crop farming.

C. Organic Matter in Various Land Uses and Slopes

Data on Organic C and Organic Matter on various land uses and the slope of the analysis results obtained can be seen in Table 5.

Table 5. Organic Matter in Various Land Uses and Slopes

Land Use	Slope	Depth (cm)	Organic C (%)	Organic matter (%)
Vegetable Plants	0-3%	0-30	10,71	18,45
		30-60	8,53	14,70
	3-8%	0-30	11,32	19,53
		30-60	7,63	13,15
	8-15%	0-30	7,35	12,70
		30-60	6,50	11,20

Secondary Forest	8-15%	0-30	8,18	14,10
		30-60	7,54	13,00
Paddy Field	0-3%	0-30	12,82	22,10
		30-60	9,76	16,83
Plantation	0-3%	0-30	9,05	15,60
		30-60	12,53	21,60
	3-8%	0-30	10,59	18,25
		30-60	11,14	19,20
	8-15%	0-30	7,66	13,20
		30-60	6,38	11,00

Source: Data analyses

Horticultural land has a relatively high organic matter content, namely 11.20-19.53%, which is suspected of adding organic matter in each growing season, once every 3 months. Organic matter in secondary forest land is also relatively high, namely 14.10 % and 13.00 %. Paddy fields are classified as high to very high, with 22.10 % and 16.83 % values. Plantation land has a high organic matter value, between 11.00 and 21.60 %. The high value of organic matter content is due to Andisols originating from volcanic ash, and the soil at the study site has a sandy loam texture and crumb structure (Tabel 4).

The analysis reveals that the organic matter content in rice fields surpasses that in secondary forests, plantations, and vegetable crops. According to the criteria established by the Soil Research Institute, this value is categorized as very high. The organic material content in secondary forests, plantations, and vegetable crops is relatively high. The abundance of organic material in secondary forests is attributed to a high source of organic material on the land, where the decomposition process and utilization of organic material are effectively balanced by the availability of organic material in the forest soil. While the organic material content is relatively high in secondary forest land, it does not exceed that of rice fields, vegetable crops, and plantations. The prevalence of secondary forest land in rocky areas is believed to influence the organic material in secondary forests.

The plantation where the soil samples were taken is a coffee plantation owned by residents. The analysis results show that the soil on this coffee plantation has a relatively high organic matter, but the soil organic matter in the vegetable crops is slightly higher. Falling coffee leaves contribute organic material, and green manure fertilization makes coffee plantations have a high organic material content.. Lerch, Dignac, Thevenot, Mchergui, & Houot (2019); Olubukola, Aderemi, Tinuke, Akinwunmi & Oladipupo (2010) Less utilization leads to abundant sources of organic material; soil abundant in organic content possesses exceptional chemical, biological, and physical attributes. Nasution and Yusfaneti (2021) revealed that the high soil organic matter in coffee plantations is due to the return of organic matter to the soil in the form of litter.

The vegetable plants exhibit a relatively elevated organic material content due to the supplemental organic input during each crop rotation, occurring approximately once every three months. Farmers apply green manure and organic fertilizers as part of the fertilization process. Yulnafatmawita, Maira, Junaidi, Yusmini & Hakim (2005) Supplying substantial amounts of organic material is connected to endeavors to enhance phosphorus (P) availability, as organic material is essential to break down P bonds, making it accessible to plants. The limited accessibility of P, bound by the mineral allophane, poses a challenge for agriculture in Andisols terrain. Andisols originate from volcanic ash, are black, and possess low bulk density. These soils contain clay minerals predominantly composed of amorphous aluminum compounds such as allophane, with alophane content exceeding 60% in some cases. The extensive surface area of allophane minerals contributes to the strong adsorption, binding, or fixation of phosphorus (P) in Andisols. Farmers generally use mulch on their vegetable fields to prevent erosion, keep the temperature stable, and maintain soil moisture. They use plant remains as mulch by placing them on the soil's surface to substitute for organic material transported during harvest. According to Surya, Nuraini, and Widianto (2017), The decomposition of organic material leads to soil becoming more porous, enhancing both aeration and soil structure. This process also contributes to the reduction of soil bulk density and an increase in overall soil porosity, thereby enhancing nutrient availability (Widodo & Kusuma (2018); Ningsih, Syafria, & Akmal (2022); Paramananthan (2013). The application of cow manure resulted in the highest soil porosity at 64.95%, followed by vermicompost at 63.64%. The most favorable soil porosity was achieved using mixed manure (Kakabouki et al., 2021).

Andisols have fertile and loose soil and have good physical properties. Even though vegetable fields have high organic matter, the organic matter in vegetable fields is not higher than in paddy fields and secondary forests. Soil organic matter can be rapidly replenished in land cultivated with short-cycle annual crops, while frequent tillage due to short rotations of vegetable crops results in a decline in organic matter. Rice fields are not processed intensively; they are only planted once a year, and plant residues are not thrown away but are used as a substitute source of organic material. It causes the organic material content in rice fields to be higher than that of organic material in secondary forests and vegetable fields.

Organic carbon plays a crucial role in the global carbon cycle, contributing to the sustainability of ecosystems. (Agus, 2012). Soil Organic C is formed through several stages of decomposition of organic matter. Several external factors, such as soil type, temperature, rainfall, and organic matter input from above-ground biomass, can influence organic C. Organic C is part of the soil or a complex system originating from plant and animal residues that continuously change the soil, which is influenced by physical, biological and chemical factors. Organic C is also organic matter found in or on the soil surface, which comes from natural carbon compounds, including all types of organic compounds found in the soil (Supryono, 2009).

C-organic obtained in this study was classified as moderate and high. It is caused by several factors, such as soil depth, the deeper the soil layer, the less organic matter it eats, and the climatic factor, where low temperatures and sufficient rainfall intensity result in an abundance of organic matter. Soil texture also affects organic matter, where soil containing much clay has a lower oxidation level. Organic C in secondary forest land at a depth of 0-30 cm is relatively high due to the large amount of tree litter, which results in a large amount of humus on the land. Vegetable land has a high C-organic content due to the frequent addition of organic matter to the land, which causes the soil to be loose and maintain its nutrients so that the organic C is high. Subowo (2010) asserts that soils containing more than 2% organic matter benefit plants because they can retain moisture, increase pH, inhibit the development of complex soil structures, improve cation exchange capacity, and stimulate biological activity and soil fertility.

Organic matter on slopes of 0-3% is relatively high compared to organic matter on slopes of 3-8% and 8-15%. It is because the slope of the slope affects the organic matter. More excellent slopes result in reduced surface organic material. Erosion processes cause the transportation of organic material by surface runoff, leading to accumulation in lower regions. Consequently, these lower areas exhibit high organic material content due to sedimentation, and the soil in this research location appears thicker than in sloped areas. According to Arsyad (2010), steeper slopes will increase surface runoff velocity, increasing surface carrying energy. The most significant energy from surface runoff will occur on the middle slope, where this slope is positioned as a transportation area.

In areas with a slope ranging from 0-3%, variations in organic matter are observed at depths of 0-30 cm and 30-60 cm. Vegetable fields, secondary forests, and rice fields exhibit elevated organic matter levels at a depth of 0-30 cm, whereas plantation fields display higher organic matter content at 30-60 cm depth. The observed phenomenon is attributed to the fact that the study site features soil originating from volcanic parent material, characterized by elevated organic matter content, low bulk density, increased water holding capacity, and high total porosity, yet exhibiting loose consistency, minimal plasticity, and a non-sticky nature. At a depth of 30-60 cm, the organic matter content in rice fields is higher than in vegetable fields and secondary forests at the same depth.

D. Bulk Density and Total Pore Space on Various Land Uses and Slopes

Data regarding bulk density and total pore space across different land uses, along with the outcomes of slope analysis, is available in Table 6. The higher the organic matter content of the soil, the higher the total pore space, but the lower the specific gravity. According to Haridjaja (2013), Endriani (2010), and Rigane and Medhioub (2011), inadequate soil physical characteristics hinder the development of plant roots as they face challenges in penetrating the soil, leading to difficulties in nutrient absorption. However, this situation can be ameliorated by applying manure Kakabouki *et al.* (2021); Zhang & Fang (2007)

Table 6. The Bulk Density and Total Pore Space in Various Land Uses

Land Use	Slope	Depth (cm)	Bulk Density	Total Pore Space
Vegetable Plants	0-3%	0-30	0,68	70,21
		30-60	0,85	61,95
	3-8%	0-30	0,75	66,33
		30-60	0,80	63,97
	8-15%	0-30	0,73	72,98
		30-60	0,80	68,91
Secondary Forest	8-15%	0-30	0,77	66,84

		30-60	0,78	64,34
Paddy Field	0-3%	0-30	0,57	79,39
		30-60	0,65	74,80
Plantation	0-3%	0-30	1,09	64,96
		30-60	0,78	62,09
	3-8%	0-30	0,83	63,23
		30-60	0,86	62,92
	8-15%	0-30	0,69	66,90
		30-60	0,69	69,16

Source: Data analyses

Paddy fields exhibit lower bulk density in areas with a 0-3% slope and soil depth ranging from 0-30 cm compared to other land uses like secondary forests, plantations, and vegetable crops. According to the Soil Research Institute's criteria for soil physical properties, the bulk density and total pore space in secondary forests, vegetable fields, and plantation lands are moderate (Table 6). Paddy fields possess a relatively low specific gravity, resulting in a high total pore space. It is attributed to the sandy loam texture and crumbly structure of the soil in the research area, providing ample opportunities for water to pass through.

Bulk density shows an inverse relationship with the total pore space of the soil. Secondary forests exhibit a medium bulk density, attributed to a significant amount of litter falling onto the ground surface. This litter contributes to soil organic matter, resulting in low bulk density and increased total pore space. Coffee plantations exhibit a higher bulk density compared to vegetable fields, which undergo more frequent planting. The congestion in coffee plantation land results from infrequent tillage and human activities during harvesting, fertilizing, weeding, and maintenance.

Additionally, rocks originating from the mountains and mixing with the soil contribute to a higher bulk density in coffee plantations than in vegetable fields. The bulk density of vegetable fields is categorized as medium, yet lower than that found in coffee plantations. This difference can be attributed to the more frequent cultivation of vegetable land compared to coffee plantations, along with the relatively higher organic material content in vegetable fields. The bulk density on the slopes of 0-3%, 3-8%, and 8-15% is low with values ranging from 0.57-1.09. It is because the soil is loose and rich in organic matter, which results in low volume weight. The bulk density value on plantation land with a depth of 0-30 cm is a value of 1.09, which is thought to be due to the presence of rocks in the land. This is because taking intact soil samples usually runs typically, but rocks are found when drilling the soil at that depth. It is these rocks that result in high volume weights at that depth.

E. Water Content in Various Land Uses and Slopes

Field water content, typically expressed as a percentage by weight, is the amount of water remaining in the soil after excess gravitational water has been removed. Water availability is a critical component of plant growth. Soil bulk density and water storage capacity are correlated; soil bulk density is influenced by soil organic matter content (Murniyanto (2007); Delsiyanti, Widjajanto, & Rajamuddin (2016); Sukariawan, Rauf, Sutanto, & Santoso (2015).

Table 7 shows that the soil water content in paddy fields is the highest compared to the soil water content in secondary forests, plantations, and vegetable crops. The elevated soil water content observed in rice fields results from the high presence of organic matter, creating numerous micro and macro pores that facilitate water infiltration into the soil. Additionally, the frequent flooding of rice fields and their direct connection to the Rawa Bento Swamp contribute to this phenomenon. Paddy field soil's sandy loam texture and crumb structure contribute to the high soil water content by fostering a substantial total pore space and a low volume weight. Rayes (2000) stated that The characteristics of Andisol soil undergo alterations when employed in rice fields. Saturating paddy field soil with water for a specific duration and processing it in a waterlogged state induce various modifications in the soil's physical, chemical, biological, and morphological properties.

Table 7. Water Content in Various Land Uses and Slopes

Land Use	Slope	Depth (cm)	Water Content
Vegetable Plants	0-3%	0-30	57,96
		30-60	61,81
	3-8%	0-30	67,63
		30-60	70,76
	8-15%	0-30	82,41
		30-60	67,29

Secondary Forest	8-15%	0-30	70,46
		30-60	74,44
Paddy Field	0-3%	0-30	124,89
		30-60	100,54
Plantation	0-3%	0-30	28,12
		30-60	69,57
	3-8%	0-30	67,25
		30-60	67,71
	8-15%	0-30	91,71
		30-60	98,83

Source: Analysis Result

The water content in secondary forest land is relatively high because much organic matter from leaf litter, twigs, and the presence of dense trees makes the soil condition moist. Water content in plantation land is lower than in paddy fields and secondary forests. Due to farmer activities, low water content is caused by compacted soil, and water cannot pass through, so rainwater goes directly to lower areas. In vegetable fields, the high water content of the soil compared to plantations is due to the large number of micro and macro soil pores and the influence of a systematic tillage system to increase the total pore space. The increased total pore space results in more water entering the soil.

The slope is also one of the factors that affect the water content. This is because water flows from high areas to lower areas. In addition, there are also land cover factors that result in high water levels in the land. Lee & Kim (2019) state that on sloping land, the movement of precipitation water that enters the soil profile does not only occur vertically, as on flat land, but also laterally parallel to the land surface and moves downwards.

CONCLUSION

Based on an examination of various physical attributes of Andisol in different land uses within Jernih Jaya Village, Gunung Tujuh District, Kerinci Regency, it can be inferred that the physical properties of Andisol are deemed favorable due to its sandy clay texture, crumb structure, elevated organic matter, low to medium volume weight, medium to high total pore space, and high water content. The maximum recorded organic matter content was 22.10%, the highest water content reached 124.89%, the minimum specific gravity was 0.57 g/cm3, and the highest total pore space was 79.39%, notably observed in paddy fields at a depth of 0-30 cm and a slope of 0-3%.

REFERENCES

Agus, F (2012). Konservasi tanah dan karbon untuk mitigasi perubahan iklim mendukung keberlanjutan pembangunan pertanian., IAARD Press

Anda, M, & Sarwani, M (2012). Mineralogy, chemical composition, and dissolution of fresh ash eruption: new potential source of nutrients. *Soil Science Society of America Journal, Wiley Online Library*, doi: https://doi.org/10.2136/sssaj2011.0305

Arsyad, U (2010). Analisis erosi pada berbagai tipe penggunaan lahan dan kemiringan lereng di daerah aliran sungai jeneberang hulu. Disertasi. Program Pasca Sarjana Universitas Hasanuddin.

Burhanuddin, B, Zubaidah, Y, Saidi, A, & Yunita, D (2010). Kajian sifat fisika tanah pada berbagai penggunaan lahan di daerah gunung tandikek, kabupaten padang pariaman. *Journal Solum*. 7(2). doi: https://doi.org/10.25077/js.7.2.92-96.2010

Delsiyanti, D., Widjajanto, D., & Rajamuddin, U. (2016). Sifat fisik tanah pada beberapa penggunaan lahan di Desa Oloboju Kabupaten Sigi. *Agrotekbis: Jurnal Ilmu Pertanian.* 4(3),227-234.

Endriani. (2010). Sifat fisika dan kadar air tanah akibat penerapan olah tanah konservasi. *Journal Hirdolitan*, 1, 26 – 34.

Henny, H, Nasution, H, & Ridwan, M (2023). Sifat tanah andisol dan kelayakan usahatani kentang dengan pengolahan tanah menggunakan traktor dan pupuk organik di Kabupaten Kerinci. *Jurnal Keteknikan Pertanian Tropis*. doi: https://doi.org/10.21776/ub.jkptb.2023.011.01.06.

Hardjowigeno, S (2003). *Klasifikasi tanah dan pedogenesis, Akademika Presindo*.

Haridjaja, O. Hidayat, Y. and Maryamah, L.S. (2013). Pengaruh bobot isi tanah terhadap sifat fisik tanah dan perkecambahan benih kacang tanah dan kedelai. *Journal Ilmu Pertanian Indonesia*, 15, 147-152.

Hikmatullah dan K. Nugroho. (2010). Tropical volcanic soils from flores island. *Indonesian Journal of Tropical Soils. 15, 83-93. doi: http://dx.doi.org/10.5400/jts.2010.v15i1.83-93*

Jambak, M.K.F, Baskoro, D.P.T.J, Wahjunie, E.D. (2017). Karakteristik sifat fisik tanah pada sistem pengolahan tanah konservasi. Tanah dan Lahan, 1, 44-50.

Kakabouki, I. Folina, A. Efthimiadou, A. Karyadogianni, S. Zisi, C. Kouneli, V. Kapsalis, N.C. Katsenios, N and Travos, I. (2021). Evaluation of processing tomato pomace after composting on soil properties, yield and quality of processing tomatoes in greece. *Journal Agronomy*, 11,1-15, doi: 10.3390/agronomy11010088.

Lee, E., and Kim, S. (2019). Seasonal and spatial characterization of soil moisture and soil water tension in a steep hillslope. *Journal of Hydrology*, 568, 676-685.

Lerch, T.Z. Dignac, M.F. Thevenot, M. Mchergui, C. and Houot, S. (2019). Chemical changes during composting of plant residues reduce their mineralization in soil and cancel the priming effect. Soil Biology and Biochemistry 136, September 2019.

Murniyanto, E. (2007). Pengaruh bahan organik terhadap kadar air tanah dan pertumbuhan tanaman jagung di lahan kering. *Journal Buana Sains*, 7(1), 51-60.

Nasution, H., dan Yusfaneti, Y. (2021). Status Kepadatan Dan Agregat Andisols Pada Konversi Perkebunan Teh Menjadi Perkebunan Kopi. *Jurnal Agroecotania*, 4(1), 16-25.

Ningsih, W.U, Syafria, H. and Akmal. (2022). Efektivitas kompos pelepah sawit terhadap protein kasar, serat kasar, dan kadar abu rumput kumpai (*Hymenachne amplexicaulis* (Rudge Nees.) pada tanah podsolik merah-kuning. *Journal Peternakan Indonesia,* 24, 137-142.

Olubukola, S.A, Aderemi, O. Tinuke, E.A.D. Akinwunmi, A.H. and Oladipupo, A.J. (2010). Comparing the use of *Tithonia diversifolia* and Compos as soil amandements for growth and yield of *Celosia argentea. New York Science Journal*, 3, 133-138.

Paramananthan, S. (2013). Managing marginal soils for sustainable growth of oil palms in the tropics. *Journal Oil Palm and the Environment,* 4, 1-16, doi: 10.5366/jope.2013.1.

Pravalie, R.(2021). Exploring the Multiple Land Degradation Pathways Across the Planet. *Earth-Science*, 220.

Rayes, M.L. (2000). Karakteristik, Genesis dan KlasifikasiTanah Sawah dari Bahan Volkan Merapi. Disertasi. Institut Pertanian Bogor.

Rigane, K.M., Medhioub, K. (2011). Assessment of properties of Tunisian agricultural waste composts: Application as com- ponents in reconstituted anthropic soils and their effects on tomato yield and quality, 55, 785–792.

Rosyidah, E., and Wirosoedarmo, R., (2013). Pengaruh Sifat Fisik Tanah pada Konduktivitas Hidrolik Jenuh Di 5 Penggunaan Lahan (Studi Kasus Di Kelurahan Sumbersari Malang). *Journal Agritech.*

Subowo, G. (2010). Strategi penggunaan bahan organik secara efisien untuk kesuburan dan produktivitas tanah melalui pemberdayaan sumber daya hayati tanah. *Journal Sumberdaya Lahan,* 1,13-25.

Sukariawan, A., Rauf, A., Sutanto, A. S., and Santoso, B. (2015). Pengaruh kedalaman muka air tanah terhadap lilit batang karet clon PB260 dan sifat kimia tanah gambut di kebun Meranti RAPP Riau. *Journal Pertanian Tropik*, 2(1), 5-12.

Supryono. (2009). Kandungan C- Organik dan N- Total Pada Seresah dan Tanah Pada 3 Tipe Fisiognomi (Studi Kasus di Wanagama, Gunung Kidul, DIY). *Journal Imu Tanah*, 10(22).

Surya, J.A. Nuraini, Y. and Widianto. (2017). Kajian Porositas Tanah Pada Pemberian Beberapajenis Bahan Organik Di Perkebunan Kopi Robusta. *Journal Tanah dan Sumberdaya Lahan*, 4, 463-47.

Wahyunto, W, & Dariah, A (2014). Degradasi lahan di Indonesia: Kondisi existing, karakteristik, dan penyeragaman definisi mendukung gerakan menuju satu peta. Indonesian Center for Agriculture. 87-89.

Widodo, K.H, and Kusuma, Z. (2018). Pengaruh Kompos Terhadap Sifat Fisik Tanah Dan Pertumbuhan Tanaman Jagung di Inceptisol. *Journal Tanah dan Sumberdaya Lahan*, 5, 959-967.

World Resources Institute (WRI). (2012). *How to Identify Degraded Land for Sustainable Palm Oil in Indonesia.* Woshington DC, USA: World Resources Institute and Sekala.

Yulnafatmawita, Maira L, Junaidi, Yusmini, Hakim N. 2005. Peranan Bahan Organik dalam Pembebasan P-Terikat pada Tanah Andisols. *Journal Solum*, 2, 69-73.

Zhang, M.K. and Fang, L.P. (2007). Effect of tillage, fertilizer and green manure cropping on soil quality at an abandoned brick making site. *Soil and Tillage Research*, 93, 87–93.