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Soil Fertility Status of the Two Eruptions of Mount Tangkuban Parahu and Mount Tampomas in Tanjungsari District Sumedang Regency

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ABSTRACT: Soil fertility is one of the important factors to optimize plant growth and productivity. This study aims to analyze the status of soil fertility through soil physical analysis (texture) soil chemistry (pH H2O and KCl, C-organic, cation exchange capacity, base saturation, P_2O_5, and K_2O) in several land units of Tanjungsari District, Sumedang Regency. The method used to determine sample points is purposive sampling method by considering several land units, namely soil type map, soil parent material map, topography map (slope), land use map, and rainfall data. Soil fertility status is determined by the matching table method between the results of soil chemical analysis with soil fertility status index that refers to the Soil Research Center (PPT) 1995. The results of the matching table data analysis showed that the research area almost entirely included low fertility status criteria except for the pine forest land unit on a moderately steep slope including medium fertility status criteria. The factors of base saturation, k-potential (K_2O), and C-organic are the limiting factors of soil fertility status in the Tanjungsari District of Sumedang Regency, including the low to medium category.

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KEYWORDS: Soil Physical Characteristics, Soil Chemical Characteristics, Land Unit

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1. INTRODUCTION

Soil is a collection of natural objects on the earth's surface arranged in horizons, consisting of a mixture of mineral materials, organic materials, water, air, and is a medium for growing plants (Hardjowigeno, 2010). Soil formation factors are influenced by soil parent material, topography (slope), climate, organisms (vegetation and land use), and time. The process of soil formation will produce different soil characteristics, including aspects of chemical, physical and biological properties. The results of volcanic eruptions include mineral-rich materials that will fertilize the soil. After the weathering process, the minerals produce Andisols that are rich in nutrients such as calcium (Ca), magnesium (Mg), potassium (K) and cuprum (Cu) micro-nutrients needed by plants (Idjudin et al, 2012). The geological map of the Bandung Sheet at a scale of 1: 100,000 Silitonga (1973), shows that the soil parent material of the soil in the location of Tanjungsari District is Qyu, with geological characteristics derived from young undecomposed volcanoes, andesitic-basaltic in nature. The Qyu (Quarter young unidentified) volcanic unit has characteristics in the form of tuffaceous sand, lapilli, breccia, lava, and agglomerate which partly originated from Mount Parahu and partly from Mount Tampomas (Djuri, 1995).

The distribution of soil fertility status in an area can be determined by survey for soil mapping on a land. Land unit characteristics can be obtained from overlaying several base maps such as soil type maps, land use maps, topographic maps (slope), geological maps (soil parent material), and rainfall data to determine the type of climate in the area. Land use and slope are two factors that can affect soil erosion, soil formation, and physical, chemical, and biological soil properties. According to Septianugraha and Suriadikusumah (2014), slope greatly affects the process of weathering and soil development, leaching, and soil transport. Maranon et al, (2002) stated that land use can affect the value of C-organic content, nitrogen, phosphorus, cation exchange capacity.

The results of soil fertility status can be used for agricultural land use planning. Fertility status can also be used to assess and review soil fertility in order to find out which nutrients are limiting factors or constraints for plants.

2. MATERIALS AND METHODS

2.1 Time and Place

The research was conducted from March to June 2024 in Tanjungsari District, Sumedang Regency. Analysis of physical characteristics was conducted in the laboratory of Soil Physics, Soil and Water Conservation, Genesis and Classification, Land Evaluation, Faculty of Agriculture, Padjadjaran University, Jatinangor, West Java. Analysis of soil chemical characteristics was conducted in the laboratory of Soil Fertility and Plant Nutrition, Faculty of Agriculture, Universitas Padjadjaran, Jatinangor, West Java.

2.2 Tools and Materials

The tools used in this study include: 1) labels, 2) soil drill (Belgian drill), 3) plastic bags, 4) field knife, 5) photo camera, 6) stationery, 7) personal computer (PC), 8) Google Earth software, 9) Arc Map 10.8 software, 10) Microsoft Exel, 11) Soil physics laboratory equipment, and 12) Soil chemistry laboratory equipment.

The materials used in this study are: 1) Rainfall climate data, 2) Earthquake map of Sumedang area scale 1:25,000, 3) Soil map and geological map of Sumedang area digitized at a scale of 1:75,000, 4) Slope map of Sumedang area scale 1:50,000, 5) Land use map of Sumedang area scale 1:50,000, 6) Land unit map, 7) Soil physics analysis materials, and 8) Soil chemistry analysis materials.

2.3 Research Methods

2.3.1 Soil Sampling Point

Determining soil sampling points using purposive sampling method with several considerations from land unit characteristics, namely soil type, soil parent material, climate, land use, and slope.

Table 1. Location of Sampling Centers and Coordinate Points of Soil Samples

Sample Code	Landuse	Slope	Location	Sampling Point Coordinates	
				Longitude	Latitude
PF	Pine Forest	15-25%	Cikaso	6°50'16.44"S	107°47'10.24"E
PF		15-25%	Cikakak	6°50'21.51"S	107°47'01.33"E
PF		25-45%	Cijambu	6°49'57.43"S	107°47'03.58"E
PF		25-45%	Cijambu	6°50'06.50"S	107°47'10.85"E
CP	Coffee Plantation	15-25%	Cisereh	6°50'45.16"S	107°47'13.05"E
CP		15-25%	Kadakajaya	6°50'59.20"S	107°47'38.70"E
CP		25-45%	Jaganala	6°49'37.78"S	107°48'12.76"E
CP		25-45%	Cikeureuteuw	6°49'59.85"S	107°47'40.84"E
FL	Farmland	15-25%	Ciwangsan	6°50'24.50"S	107°48'16.96"E
FL		15-25%	Cipeles	6°50'33.25"S	107°48'19.49"E
FL		25-45%	Kertajati	6°50'42.41"S	107°47'37.38"E
FL		25-45%	Parigi	6°50'44.32"S	107°47'24.60"E

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland

2.3.2 Determination of Soil Fertility Status

Determining the distribution of soil fertility status is determined based on the results of soil chemical analysis referring to the Bogor Soil Research Center (1995) and then using the matching table method to determine the fertility status of a land unit by matching the results of the analysis of soil chemical characteristics with the soil fertility status index referring to the Bogor Soil Research Center (1995).

3. RESULTS AND DISCUSSION

3.1 General Condition of the Research Area

The research location is in Tanjungsari District, Sumedang Regency, West Java Province, Indonesia, which lies at 6°54'12.34"South latitude and 107°48'4.92" East longitude. South latitude and 107°48'4.92" East longitude. The area of Tanjungsari District is approximately 44.86 km2 with a total of 12 villages. Tanjungsari sub-district is at an altitude of 855 meters above sea level.

3.1.1 Materials of the Research Area

The material of the soil parent in the location of Tanjungsari Subdistrict is Qyu (Quarter young unideintified) which is Pleistocene in age and is the result of a young undecomposed volcano partly from Mount Tangkuban Parahu and partly from Mount Tampomas and is andesitic-basaltic (Djuri, 1995).

3.1.2 Soil Type of the Research Area

According to the results of digitization of soil maps and geological maps of the Sumedang Region at a scale of 1: 75,000 Soil Research Institute 1973, it shows that most of the Tanjungsari area of Sumedang Regency has the order Andisols.

3.1.3 Climate of the Research Area

Determination of climate type at the research location using the Oldeman classification. The calculation obtained that Tanjungsari Subdistrict of Sumedang Regency has six wet months from November to April and five dry months from May to September. Based on these results, it shows that the research location is included in climate type C with agroclimate zone C3.

3.1.4 Land Use of the Research Area

The land use selected for the research site is pine forest, coffee plantations, and moorland. In the pine forest land use in the research location, it is actively cultivated to utilize its sap. Around the pine trees there are several annual plants and some coffee plantations. Coffee plantation land use in the research location is dominated by Arabica coffee types, but there are also some who cultivate Robusta coffee in small quantities. The use of moorland in the research location is determined by similar plant commodities in each land unit, namely tobacco, cabbage, tomato and chili plants.

3.1.5 Slope of the Research Area

The land slope selected for the research location has two different classes, namely moderately steep slopes (15-25%) and steep slopes (25-45%). Determination of this slope considers the land use that will be used.

3.1.6 Land Unit of the Research Area

Determination of each land unit to be used in the research area is generated from overlaying several maps, namely land use map, soil type map, geological map (soil parent material), slope map and rainfall data to determine climate type. Based on the overlay results, 12 land units were obtained in the Tanjungsari sub-district area.

Table 2. Land Unit of Tanjungsari Sub-district, Sumedang Regency

Sample Code	Landuse	Slope	Total Area (ha)
PF (K1)	Pine Forest	15-25%	41,44
PF (K1)		15-25%	
PF (K2)		25-45%	98,11
PF (K2)		25-45%	
CP (K1)	Coffee Plantation	15-25%	13,62
CP (K1)		15-25%	
CP (K2)		25-45%	53,57

Table 2. Land Unit of Tanjungsari Sub-district, Sumedang Regency

CP (K2)	Coffee Plantation	25-45%	53,57
FL (K1)	Farmland	15-25%	36,09
FL (K1)		15-25%	
FL (K2)		25-45%	62,07
FL (K2)		25-45%	

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

3.2 Results of Soil Physics Analysis

3.2.1 Soil Texture

The soil texture studied in each land unit uses three fractions, namely sand, silt, and clay. Soil texture classes in Tanjungsari District, Sumedang Regency include loam and dusty clay loam.

Table 3. Soil Texture in Different Land Uses and Slopes

Landuse	Percentage (%)			Kelas Tekstur
	Sand	Silt	Clay	
PF (K1)	31	47	22	Loam
PF (K1)	25	47	28	Loam
PF (K2)	20	46	34	Sandy Silt Loam
PF (K2)	33	38	29	Loam
CP (K1)	18	46	36	Sandy Silt Loam
CP (K1)	8	58	34	Sandy Silt Loam

CP (K2)	32	43	25	Loam
CP (K2)	37	41	22	Loam
FL (K1)	14	46	39	Sandy Silt Loam
FL (K1)	20	53	26	Sandy Silt Loam
FL (K2)	29	48	23	Loam
FL (K2)	16	49	35	Sandy Silt Loam

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

The sandy silt loam texture has more silt and clay fractions but the silt fraction is more dominant. According to Kartina et al (2016) the texture of sandy silt loam has better characteristics than sandy clay. Clay content in soil can affect cation exchange and affect structural aggregation. Clay texture has more water content because it has a relatively large surface area so it is not easy to pass water so that it can hold nutrients and has a fairly good fertility level and contains many nutrients.

3.3 Results of Soil Chemical Analysis

3.3.1 Soil Reaction (Soil pH)

Soil reaction (pH) is related to the availability of nutrients in the soil. The results of laboratory analysis show that soil pH in different land uses and slopes is classified as slightly acidic to acidic. Determination of soil pH criteria refers to the criteria for assessing soil chemical properties based on the soil research center (1995).

Table 4. The Value of Soil pH H_2O in Different Landuse and Slope

Landuse	pH H_2O	Categories
PF (K1)	5,53	Slighty Acid
PF (K1)	5,87	Slighty Acid
PF (K2)	5,82	Slighty Acid
PF (K2)	5,90	Slighty Acid
CP (K1)	5,79	Slighty Acid
CP (K1)	5,44	Moderately Acid
CP (K2)	5,62	Slighty Acid
FL (K1)	5,41	Moderately Acid
FL (K1)	5,49	Moderately Acid
FL (K2)	5,56	Slighty Acid
FL (K2)	4,85	Moderately Acid

Table 4. The Value of Soil pH H_2O in Different Landuse and Slope

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

Table 5. The Value of Soil pH KCl in Different Landuse and Slope

Landuse	pH KCl
PF (K1)	5,49
PF (K1)	5,42
PF (K2)	5,40
PF (K2)	5,29
CP (K1)	5,20
CP (K1)	4,06
CP (K2)	4,30
CP (K2)	4,50
FL (K1)	4,07
FL (K1)	4,36
FL (K2)	4,51
FL (K2)	3,92

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

Factors that affect soil pH include rainfall, continuous tillage, use of inorganic fertilizers, lack of soil organic material, slope, or the influence of surrounding vegetation (Benu & Mudiata, 2013). A low pH value not only inhibits plant growth but also affects the availability of other nutrients that affect soil fertility.

3.3.2 Soil Organic Material (C-organic)

Organic material can increase the activity of microorganisms in the soil. The results of laboratory analysis show that different land uses and slopes produce organic materials including low to very high criteria. The determination of criteria refers to the assessment of soil chemical properties based on the soil research center (1995).

Table 6. The Value of C-organic in Different Landuse and Slope

Landuse	Slope	%C-Organik	Categories
PF (K1)	15-25%	5,84	Very High
PF (K1)	15-25%	2,44	Medium
PF (K2)	25-45%	4,52	High
PF (K2)	25-45%	4,80	High
CP (K1)	15-25%	2,52	Medium
CP (K1)	15-25%	1,64	Low
CP (K2)	25-45%	4,96	High
CP (K2)	25-45%	4,28	High
FL (K1)	15-25%	1,72	Low
FL (K1)	15-25%	1,36	Low
FL (K2)	25-45%	2,64	Medium
FL (K2)	25-45%	1,00	Low

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

Pine forest land use can be said to be quite volatile in each slope class. The difference in organic material content is thought to be due to different land and soil processing in each land use. Coffee plantation land use shows an increase on steep slopes compared to moderately steep slopes. This can occur because steeper slopes have better canopy vegetation that can prevent erosion and denser vegetation can cause more organic material to the soil through the fall of leaves, twigs, and other organic materials. The moor land use is dominated by low C-organic. This is probably because intensive agricultural activities using inorganic fertilizers can reduce the intake of organic materials into the soil.

3.3.3 Cation Exchange Capacity

Cation exchange capacity (CEC) in soil determines the level of soil fertility and avoids nutrient loss due to leaching of nutrients, especially basic elements (Hartati., et al, 2013). The results of laboratory analysis obtained CEC which is classified as medium to high. The determination of these criteria refers to the criteria for assessing soil chemical properties based on the soil research center (1995).

Table 7. The Value of Soil CEC in Different Landuse and Slope

Landuse	Slope	Cation Exchange Capacity (me/100g)	Categories
PF (K1)	15-25%	30,23	High
PF (K1)	15-25%	29,00	High
PF (K2)	25-45%	28,51	High
PF (K2)	25-45%	39,34	High
CP (K1)	15-25%	27,06	High
CP (K1)	15-25%	19,91	Medium
CP (K2)	25-45%	32,14	High
CP (K2)	25-45%	34,01	High
FL (K1)	15-25%	24,64	High
FL (K1)	15-25%	25,08	High
FL (K2)	25-45%	28,76	High
FL (K2)	25-45%	22,91	Medium

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

The results of laboratory analysis, soil CEC is almost entirely classified as high except for two land units classified as medium. In the land unit classified as medium, it is suspected that the low organic material and acidic pH caused the CEC to be classified as medium. According to Mukhlis (2007), the lower the organic material content, the soil CEC content will be moderate to low. The high CEC value is thought to be due to the influence of organic material that has cation absorption power and provides better nutrients.

3.3.4 Base Saturation (BS)

Base saturation (KB) has a very important contribution to soil fertility and is a comparison between the number of base cations in the soil that can be exchanged by the cation exchange capacity so that it can determine the presence of nutrients in the soil needed by plants (Andira et al., 2022). Different landuse and slope results in base saturation included in the criteria of very low to medium. The determination of these categories refers to the criteria for assessing soil chemical properties based on the soil research center (1995).

Table 8. The Value of BS in Different Landuse and Slope

Landuse	K-dd	Na-dd	Ca-dd	Mg-dd	Σ Base Cation	CEC	BS	Categories
		m.e/100g					%	
PF (K1)	0,54	0,04	7,26	0,79	8,62	30,23	28,53	L
PF (K1)	0,76	0,06	9,28	0,78	10,88	29,00	37,51	M
PF (K2)	0,14	0,05	6,37	0,83	7,40	28,51	25,96	L
PF (K2)	0,10	0,08	7,26	0,64	8,07	39,34	20,52	L
CP (K1)	0,51	0,07	8,58	0,97	10,13	27,06	37,44	M
CP (K1)	0,28	0,09	6,89	0,38	7,65	19,91	38,41	M
CP (K2)	1,70	0,03	6,39	0,74	8,86	32,14	27,58	L
CP (K2)	2,43	0,02	7,88	1,20	11,52	34,01	33,87	L
FL (K1)	1,05	0,01	1,49	0,28	2,84	24,64	11,51	VL
FL (K1)	1,03	0,04	6,61	0,81	8,49	25,08	33,86	L
FL (K2)	0,71	0,04	8,76	0,59	10,10	28,76	35,11	L
FL (K2)	0,92	0,01	3,07	0,43	4,43	22,91	19,35	VL

Table 8. The Value of BS in Different Landuse and Slope

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%; VL=Very Low; L=Low; M=Medium

Saturation of bases is very influential with soil pH, if the soil pH is high then the saturation of bases is also high, otherwise if the saturation of bases is low it means that many acidic cations are strongly absorbed in soil colloids (Teul., et al 2024). On pine forest land and coffee plantations tend to decrease on steep slope classes. This is thought to be because steep slopes have the potential for greater nutrient leaching if not properly conserved. On moorland tends to fluctuate on different slopes. This can occur due to the influence of organic material which causes differences in BS values in each land unit.

3.3.5 P-Potential (P_2O_5)

Phosphorus (P) is one of the essential nutrients for plants. The results of laboratory analysis of P-Potential show different land uses and slopes are included in the medium to very high criteria. The determination of these criteria refers to the criteria for assessing soil chemical properties based on the soil research center (1995).

Table 9. The Value of P-Potentialin Different Landuse and Slope

Landuse	ppm Curve	mg P_2O_5/100g	Categories
PF (K1)	6,67	54,22	High
PF (K1)	7,63	61,97	Very High
PF (K2)	4,05	31,35	Medium
PF (K2)	8,33	69,09	Very High
CP (K1)	8,02	65,27	Very High
CP (K1)	7,62	62,97	Very High
CP (K2)	8,45	68,96	Very High
CP (K2)	13,45	110,67	Very High

FL (K1)	13,70	113,81	Very High
FL (K1)	9,84	82,21	Very High
FL (K2)	7,20	58,84	High
FL (K2)	7,88	64,68	Very High

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

Based on the results of laboratory analysis, the P-Potential value in land units that have decreased is thought to be due to the lack of agricultural activities around the land and causes the P content to only receive from organic material without fertilization. On land use that has increased, it is suspected to occur because there are many intensive agricultural activities so that on the land there is a higher soil P content because it receives organic material as well as fertilization.

3.3.6 K-Potential (K_2O)

Potassium (K) is one of the essential nutrients needed by plants to support plant growth and development. According to Al Mu'min, et al (2016) the amount of K in the soil that can be absorbed by plants is only small. The results of laboratory analysis show that different land uses and slopes produce K-potential including very low to moderate criteria. The determination of these criteria refers to the criteria for assessing soil chemical properties based on the soil research center (1995).

Table 10. The Value of K-Potentialin Different Landuse and Slope

Landuse	K-Potential Test (mg.K_2O/100g)			Categories
	A	B	Average	
PF (K1)	20,43	21,72	21,07	Medium
PF (K1)	16,39	17,69	17,04	Low
PF (K2)	6,49	6,95	6,72	Very Low
PF (K2)	7,90	8,34	8,12	Very Low
CP (K1)	15,81	16,60	16,21	Low
CP (K1)	16,61	16,83	16,72	Low
CP (K2)	30,07	31,87	30,97	Medium
CP (K2)	31,62	33,30	32,46	Medium
FL (K1)	23,19	23,80	23,49	Medium
FL (K1)	25,89	27,86	26,87	Medium
FL (K2)	24,50	26,29	25,39	Medium
FL (K2)	27,19	29,03	28,11	Medium

Table 10. The Value of K-Potentialin Different Landuse and Slope

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%; A= Test-1; B=Test-2

Kalium nutrient availability is strongly influenced by pH and base saturation. At low pH and low base saturation, potassium is easily leached and conversely at neutral pH and high base saturation potassium is bound by calcium. Based on the results of laboratory analysis on land units that experienced a decrease in K nutrients, it is suspected that due to steep slopes and improper tillage, it becomes more susceptible to erosion due to rainwater runoff, causing the loss of the top layer of soil that is rich in nutrients. The increase in K nutrients on steep slopes is thought to be due to the addition of soil K apart from fertilization as well as from organic material.

3.4 Soil Fertility Status

Determination of soil fertility status is obtained from the results of soil chemistry data analysis, namely cation exchange capacity, base saturation, P2O5, K2O, and C-organic which are then determined based on soil chemistry criteria referring to the Soil Research Center (PPT) in 1995. The results of soil chemistry criteria will be used as a determination of soil fertility status by matching table between soil chemistry criteria with soil fertility status index referring to PPT (1995). The research location by selecting several land units in Tanjungsari District of Sumedang Regency obtained medium to low fertility status.

Table 11. Soil Fertility Status of Tanjungsari Sub-district, Sumedang Regency

Landuse	CEC (cmol/kg)	BS (%)	P_2O_5 (mg/100g)	K_2O (mg/100g)	C-Organik (%)	Fertility Status
PF (K1)	30.23 (T)	28.53 (R)	54.22 (T)	21.07 (S)	5.84 (ST)	Medium
PF (K1)	29.00 (T)	37.51 (S)	61.97 (ST)	17.04 (R)	2.44 (S)	Low
PF (K2)	28.51 (T)	25.96 (R)	31.35 (S)	6.72 (SR)	4.52 (T)	Low
PF (K2)	39.34 (T)	20.52 (R)	69.09 (ST)	8.12 (SR)	4.80 (T)	Low
CP (K1)	27.06 (S)	37.44 (S)	65.27 (ST)	16.21 (R)	2.52 (S)	Low
CP (K1)	19.91 (T)	38.41 (S)	62.97 (ST)	16.72 (R)	1.64 (R)	Low
CP (K2)	32.14 (T)	27.58 (R)	68.96 (ST)	30.97 (S)	4.96 (T)	Low
CP (K2)	34.01 (T)	33.87 (R)	110.67 (ST)	32.46 (S)	4.28 (T)	Low
FL (K1)	24.64 (T)	11.51 (SR)	113.81 (ST)	23.49 (S)	1.72 (R)	Low
FL (K1)	25.08 (T)	33.86 (R)	82.21 (ST)	26.87 (S)	1.36 (R)	Low
FL (K2)	28.76 (T)	35.11 (R)	58.84 (T)	25.39 (S)	2.64 (S)	Low
FL (K2)	22.91 (S)	19.35 (SR)	64.68 (ST)	28.11 (S)	1.00 (R)	Low

Table 11. Soil Fertility Status of Tanjungsari Sub-district, Sumedang Regency

Description: PF=Pine Forest; CP=Coffee Plantation; FL=Farmland; K1=Slope 15-25%; K2=Slope 25-45%

Tanjungsari district of Sumedang Regency shows the distribution of soil fertility status almost entirely has low fertility status criteria except in HT1 (K1) land unit which shows including medium fertility status criteria. Factors affecting land units with low to moderate criteria are due to the value of KB content (heavy limiting factor), K2O (medium limiting factor), and C-organic (light limiting factor). What causes the KB value in each land unit to be very low to medium is due to the acidic soil pH. Attempts to increase the value of KB content can be made by liming each land use with various slopes, especially using dolomite lime [$CaMg(CO_3)_2$]. Soil potassium is a medium limiting factor because K nutrients in the soil are not only easily leached but also their availability is strongly influenced by pH and KB. Attempts to increase the K content in the soil can be done by applying inorganic fertilizers, namely KCl or organic fertilizers such as liquid fertilizer from coconut husk. C-organic is a mild limiting factor because there are several land units with low C-organic content values. According to Maro'ah, et al (2021), attempts to increase the value of C-organic can be done by soil management by applying organic material in the form of *Azolla and manure*. Mechanical conservation methods can be carried out by making terraces, mounds, water drains, roraks, and others.

4. CONCLUSION

1. Soil fertility status in Tanjungsari District of Sumedang Regency is categorized as low to medium. Medium fertility status is found in pine forest land units on a slope of 15-25% (moderately steep) and other land units are categorized as low fertility status.
2. The factors of base saturation, K-potential (K_2O), and C-organic cause the soil fertility status in the study area to be in the medium to low category.

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