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IDENTIFICATION OF SOIL FERTILITY STATUS OF SUBAK RICE FIELDS BASED ON SOIL CHEMICAL PROPERTIES IN DENPASAR CITY, BALI, INDONESIA

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ABSTRACT

Soil functions as a storehouse of nutrients that are needed by plants for growth and production. Decreased soil fertility will cause a decrease in productivity due to reduced nutrients in the soil. To determine the state of nutrients, it is necessary to evaluate the status of soil fertility. This study was carried out in the Subak rice fields in Denpasar City, Bali Province, Indonesia. Denpasar City, is the capital of Bali Province which continues to grow, relying on the rice production from its rice fields. The main objective of the study was to evaluate the fertility status of soils in Subak rice fields in Denpasar City based soil chemical properties and to map their fertility status using Geographic Information System (GIS). The approach for this study included surveying and soil sample analysis. The parameters observed were soil chemical properties including: CEC, Base Saturation, C-Organic, P_2O_5, K_2O and pH. The study delineated three categories of soil fertility status, namely high, moderate and low. The total area with high soil fertility was 1312.76 ha (63.77 %), while for the medium and low, the respective total areas were 560.83 ha (27.24 %) and 184.89 ha (8.98 %). The Subak condition with low soil fertility has deficiency in soil organic Carbon (C) content and low total Phosphorus (P). Recommendations for managing low soil fertility status are addition of organic matter and P fertilizer of 100 $kgha^{-1}$. The spatial distribution of soil fertility status in Denpasar City was mapped using GIS. The distribution of fertility status in these rice fields shows that the majority of the fields classified as high fertility are located in East and South Denpasar. The different fertilization regimes followed between the Subaks were the cause of the observed different soil nutrient statuses. Therefore, it is necessary to give the same treatment in order to maintain soil fertility. Soil fertility and maintenance of agricultural land productivity were factors that supported food security in Denpasar City.

Key words: Subak, Rice fields, Soil Fertility, Chemical Properties, Geographic Information System

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INTRODUCTION

Soil functions as a storehouse of nutrients that are needed by plants for growth and production [1-2]. Soil productivity is determined by the level of soil fertility and its management. Thus, soil as resource needs to be well managed for sustainable crop production [3-4].

Soil fertility is a soil condition with the amount of nutrients available in accordance with plant needs [5-6]. From seed germination to seed production, plants require essential macro and micronutrients for normal growth and development [7-9]. Soil productivity and food production are directly linked to soil fertility and plant nutrition [10]. Thus, there is need to support best soil fertility management practices to optimize and sustain rice field self-sufficiency. However, data on the soil fertility status and distribution in the rice fields are unavailable to support sustainable management practices for rice production. Thus, this study focused on evaluating soil nutrient levels and determining the spatial distribution of soil fertility status using Geographic Information Systems (GIS).

Geographic Information Systems (GIS) are an emerging technology for spatial analysis and spatial accessibility in many fields of study [11]. Geographic Information Systems technology has an important role in mapping the status and spatial distribution of soil fertility. The use of GIS technology makes it possible to analyze the spatial variability of fertility and nutrient status in the soil for a wider area and different physiographic units [12-13]. On a perspective on future developments, geospatial data have more profound impact on problem-solving in the future. Geographic Information Systems results are used for solving many real-world problems such as in planning, implementing, monitoring, evaluating and agriculture [14]. Analysis of soil fertility status using GIS is very important to spatially manage soil productivity of rice fields. Analysis of rice fields fertility is important because crop harvesting, surface water flow (run off), and leaching that occurs repeatedly causes the soil to lose nutrients and fertility. Fertility of rice fields will affect rice production as the most important crop for consumption by the people of Denpasar City and Indonesia in general. In addition, the people of Denpasar city rely on rice as a staple food and a source of carbohydrates as well as a source of livelihood.

The existence of rice fields in Denpasar City was fully supported and managed by traditional Subak organizations. Subak is a traditional organization that prioritizes managing the irrigation system for their members. The United Nations Educational,

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Scientific and Cultural Organization (UNESCO) has established Subak as world cultural heritage that must be protected [15-17]. This study aimed to evaluate the fertility status of Subak rice fields in Denpasar City, based on soil chemical properties and to map the spatial distribution of the soil fertility status categories in Denpasar City, Bali Province, Indonesia using Geographic Information System (GIS).

MATERIALS AND METHODS

This study was conducted in the Subak rice field of Denpasar City. Indonesia, located at $08^{0}35'31"$- $08^{0}44'49"$ South latitude and $115^{0}10'23$ "- $115^{0}16'27"$ East longitude. Bordering Badung Regency in North, South and West, Gianyar and Badung Strait to the East. [18]. Figure 1 shows the research location.

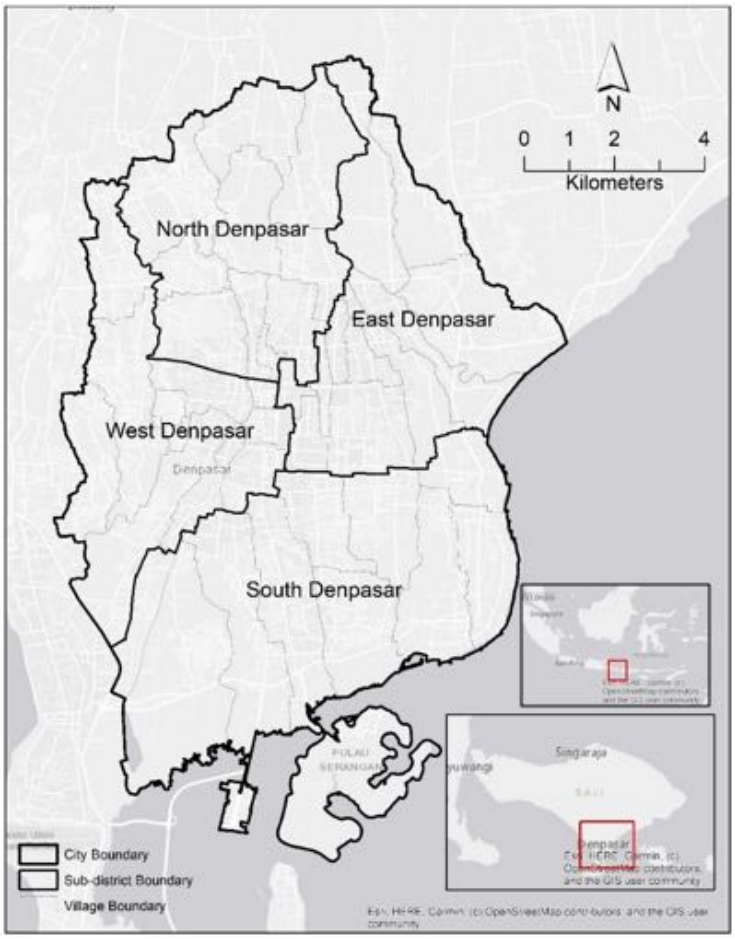

Figure 1: Location of the study in Denpasar, Indonesia

The components of soil fertility status consist of CEC, base saturation, C-Organic, P_2O_5, K_2O_5 and pH [19-20]. The activities on this study were divided into three

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stages, namely field surveys, laboratory analysis and spatial analysis. The field survey tools were those for soil sampling, namely, sample rings, Abney level, GPS, altimeter, field knife, soil drill, label paper, plastic bags, rubber bands and office stationery. The laboratory tools for soil analysis were Erlenmeyer flasks, heating devices, petri dishes, sieves, pipettes, ovens, measuring cups, bottles, test tubes, permeability determination tools, balances and chemicals.

Soils were collected during a survey to analyze soil chemical properties at the Soil Laboratory of the Faculty of Agriculture, Udayana University, Indonesia. The samples were taken at the top soil from 0 to 20 cm using field knife and placed in plastic bags. The sampling method was random clustered [21]. In using the random cluster sampling method, samples were located at the center of each of the Subak areas. Geographic Information Systems (GIS) software was used to draw Subak boundary and to determine the center point of the Subak polygons. A total of 41 soil samples were collected. Samples were collected from the center point of each Subak area. Table 1 shows the sample location points of each Subak. Figure 2 shows the Subak rice fields and soil sampling points for each Subak.

Analyses of soil chemical properties werecarried out in the laboratory. Cation Exchange Capacity (CEC) was determined using extraction of exchangeable cations with 40% NaOH, then titrated using sulfuric acid 0.05 N. Base saturation was determined using NH_4OAc 1M, pH 7, P_2O_5 and K_2O levels were determined using 25 % HCl, C-Organic was determined using the Walkley and Black method and pH was determined using a ratio of 1 part of soil to 2.5 parts of H_20.

Soil fertility status was evaluated using matching method where the results of soil chemical analysis conducted in the laboratory were matched with the standard criteria for assessing soil fertility status. The matching results were classified into very high, high, moderate, low and very low fertility status [20, 23]. Criteria for evaluating soil chemical properties are shown in Table 2.

Spatial analyses were performed using QGIS software version 3.10. Based on data from Planning Agency of Denpasar City (Bappeda). There were 41 Subak in Denpasar City located in four districts, West Denpasar with 8 Subak, East Denpasar 15 Subak, South Denpasar 10 Subak, and North Denpasar with 8 Subak.

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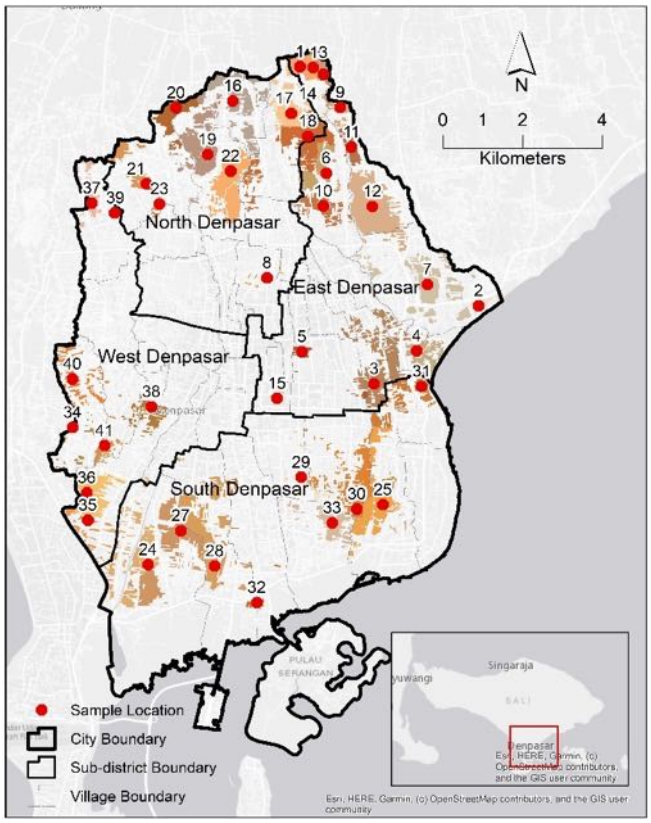

Sample	Subak Name	Sample	Subak Name
1	Anggabaya	31	Sanur
2	Biaung	32	Sesetan
3	Buaji	33	Sidakarya
4	DlodSema	34	Banyukuning
5	Kedaton	35	Lange
6	Paang	36	Mergaya
7	Padanggalak	37	Pagutan
8	Peraupan Barat	38	Semila
9	Poh Manis	39	Serogsogan
10	Saba	40	Tegal Buah
11	Taman	41	Tegallantang
12	Temaga		
13	Uma Desa		
14	Uma Layu		
15	Yang batu		
16	Dalem		
17	Kedua		
18	Lungatad		
19	Pakel I		
20	Pakel II		
21	Petangan		
22	Sembung		
23	Ubung		
24	Cuculan		
25	Intaran Barat		
26	Intaran Timur		
27	Kepaon		
28	Kerdung		
29	Panjer		
30	Renon		

Figure 2: Subak Rice Fields and Sample Location

RESULTS AND DISCUSSION

The values of Cation Exchange Capacity (CEC) for the study area were high ranged from 37.85 cmol (+) /kg of soil to 90.40 cmol (+) /kg of soil. A high CEC value (>25) is a good indicator that a soil has a high clay and/or organic matter content and can hold a lot of cations. A soil with a low CEC value (<5) is a good indication that a soil is sandy with little or no organic matter that cannot hold many cations. The high value of CEC on rice fields was due to differences in the content of organic matter which influence CEC and the availability of nutrients. The base saturation is high if the CEC is dominated by base cations of Ca, Mg, K and Na. However, if the soil CEC is dominated by Al and H (low base saturation), it can reduce soil fertility [20, 22]. Soils with a low CEC are more likely to develop deficiencies in potassium (K^+), magnesium (Mg^{2+}) and other cations while high CEC soils are less susceptible to leaching of these cations [24].

Another indication of soil fertility status can be observed from the large percentage of base saturation. Base saturation in the study area ranged from low (16%) to very high (84%). Soils with high percentage base saturation have a higher pH.

Therefore, they are more buffered against acid cations from plant roots and soil processes that acidify the soil (nitrification and acid rain). They contain greater amounts of the essential plant nutrient cations K^+, Ca^{2+} and Mg^{2+} used by plants. The soil pH value in the study area ranged from 6.5 (slightly acidic) to neutral (7.16) which is favourable for nutrient exchange and nutrient availability in soil. The high r value of base saturation, implies that the essential nutrients were also high and easily available for plant uptake by vegetation [25-27].

The C-organic content of soils in the study sites ranged from very low (0.86 %) to high (3.03%). Organic matter (C-organic) plays an important role in soil fertility because organic material mainly comes from plant residues which contain nutrients for plant growth. Soil microorganisms also depend on organic matter for nutrients. C-organic in the study area was relatively low because the residues of the crops were burned after harvest which might have decreased the soil organic matter content.

The content of P_2O_5 in the study area ranged from low (15.75 ppm) to very high (125.81 ppm). Only Subak Taman in East Denpasar Sub-district showed a low P (phosphorus) value. The Subak in Denpasar City has high P_2O_5 content due to application of P fertilizer which is commonly used by farmers. Subak Taman has a deficiency in soil organic C-content and low total P content in the soil. Addition of organic matter can improve the availability of P in the soil, because organic acids that result from decomposition of organic matter have ability to chelate Al and Fe, thereby releasing P and increasing its value [28].

Phosphorus values reflect the fertility of soils [29]. Phosphorus is essential for many critical plant functions including photosynthesis and respiration, energy transfer, cell division and enlargement, transfer of heredity traits (DNA), seed formation, early root growth and expansion, and winter hardiness. Therefore, crop productivity declines when P supplies to the crop are inadequate. Sustainable P fertilization was one of the economically and ecologically important agricultural management strategies for crop production [30-31]. The recommended dosage of P is 100 kgha-1 for low nutrient soil [32].

Based on the results of chemical analysis, the content of K_2O- at the study sites ranged from high (33.3 ppm) to very high (231.3 ppm). The high K_2O- at the study site was caused by irrigation water that carries potassium into the rice fields. The source of potassium was found in rice straw. It is also related to the high CEC values of the study area. A high CEC value has a greater capacity to maintain

adequate quantities of Ca^{2+}, Mg^{2+} and K^{+} than a soil with a low CEC [33]. Table 3 shows the chemical properties and soil fertility status of Subak rice fields in Denpasar City.

Soil fertility status in the study area was classified into three categories as low, moderate and high soil fertility. Total area with high soil fertility was 1312.76 ha (63.77 %), while for medium and low soil fertility status the total areas were 560.83 ha (27.24 %), and 184.89 ha (8.98 %), respectively. There were 20 Subak (48.78 %) categorized with high fertility status, 18 Subak (43.90 %) categorized with moderate fertility status and 3 Subak (7.32 %) with low soil fertility status.

East and South Denpasar Sub-districts comprise the biggest area of high and moderate soil fertility status. This condition was caused by the limiting factors of organic matter and total soil phosphorus which has been ameliorated by implementing improved land management practices, namely, addition of organic matter and phosphorus fertilization. East Denpasar was the only Sub-district that does not have areas with low soil fertility.

East Denpasar has total of 518.23 ha (25.18 %) of soil with high fertility status while South Denpasar has 430.46 ha (20.91 %) of area with high soil fertility status. South Denpasar has total of 202.29 ha (9.83 %) of moderate soil fertility status while East Denpasar has 133.95 ha (6.51 %) of moderate soil fertility status.

East Denpasar has the highest number of Subak with high soil fertility, with total of 6 Subak (14.63 %), followed by South Denpasar and North Denpasar, each with 5 Subak (12.20 %). East Denpasar also has the highest number of Subak with moderate soil fertility, with total of 9 Subak (21.95 %). Table 4 summarizes the soil fertility status in Denpasar City.

There were three Subak with low soil fertility status, namely, Subak Sembung, Subak Mergaya and Subak Intaran Timur. The low soil fertility status was due to the low content of organic-C. The content of organic matter is very influential on the ability of the soil to maintain fertility and productivity [34]. The addition of organic material was needed in these three Subak to maintain fertility. Meanwhile Subak Taman is low in phosphorus which adversely affected plant growth. in Subak Taman. Recommendations that can be given for rice fields in Subak Taman are by adding phosphate fertilizer such as SP36. Increasing the phosphorus content will improve soil fertility [35].

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The spatial distribution of rice fields of various categories of fertility status shows that the majority of rice fields that are classified as high fertility status were located in East and South Denpasar. North and West Denpasar were the locations of rice fields with low fertility status. Figure 3 shows the distribution of Subak rice fields of different fertility status in Denpasar City.

Rice fields in Denpasar City have different fertility status on each subak. The different levels of fertilization between Subak were the cause of the different nutrient status in the soil. Therefore, it is necessary to give the same treatment in order to maintain soil fertility. Soil fertility and agricultural land productivity were the factors that ensured food security, especially in Denpasar City.

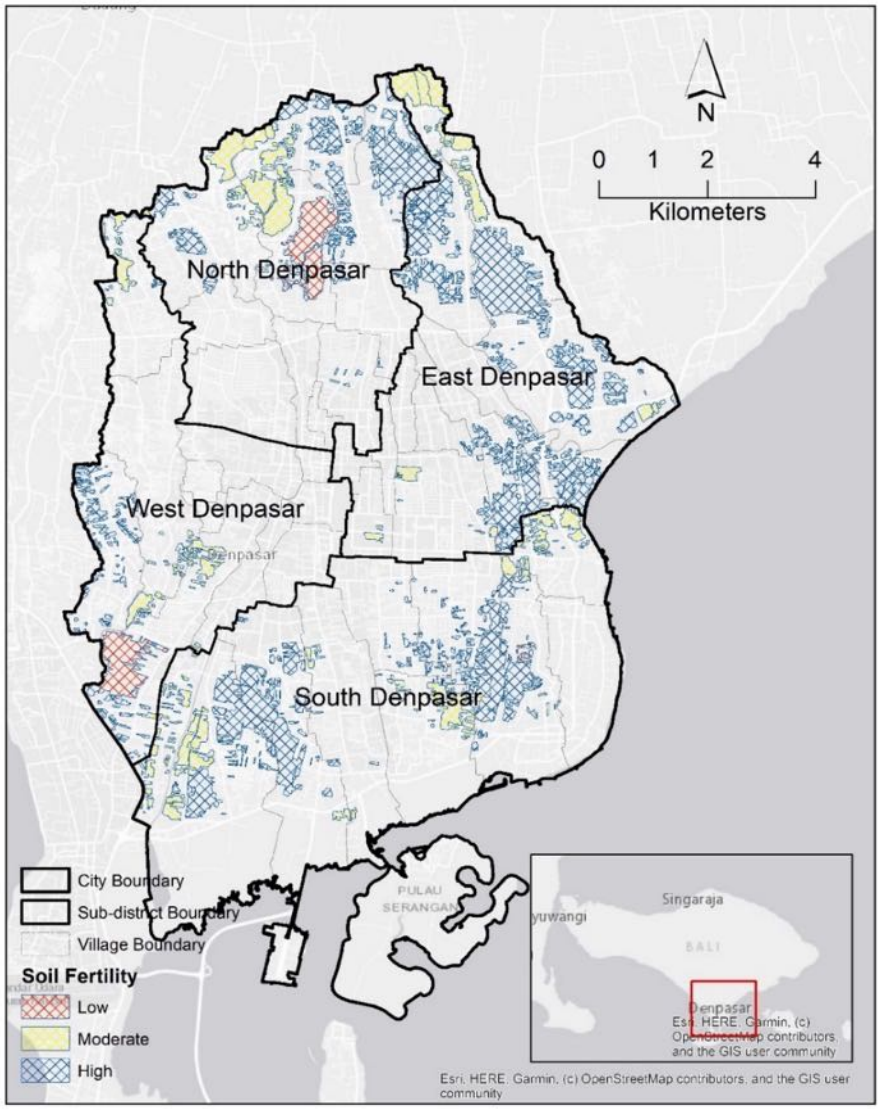

Figure 3: Spatial distribution of soil fertility status in Subak Rice fields in Denpasar City

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CONCLUSION

Soil fertility status of Subak rice fields in Denpasar City were classified into three statuses, namely high, moderate and low soil fertility. Total area with high soil fertility status was 1312.76 ha (63.77 %), total area with medium soil fertility status was 560.83 ha (27.24 %), and total area with low fertility status was 184.89 ha (8.98 %). There were 20 Subak (48.78 %) categorized with high fertility status, 18 Subak (43.90 %) categorized with moderate fertility status and 3 Subak (7.32 %) with low soil fertility status.

Subak with low soil fertility status are low in soil organic C-content and low in total P. Recommendations for managing low soil fertility status were addition of organic matter and P fertilizer.

Spatial distribution of soil fertility status was mapped using Geographic Information Systems (GIS) to identify the different categories of soil fertility status for each area in Denpasar City. The spatial distribution of rice fields with different categories of fertility status shows that the majority of rice fields that were classified as of high fertility status were located in East and South Denpasar. Rice fields with low fertility status are located in North and West of Denpasar City.

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AUTHOR CONTRIBUTION

Trigunasih is the main researcher who conceptualized and conducted the research. Wiguna is a co-researcher who conducted the analysis and spatial analysis using Geographic Information System (GIS) tool and also co-wrote the manuscript. All were key in the development, drafting and finalizing of this manuscript.

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Table 1: Sample Location

Sample	Coord. X	Coord. Y	Subak Name	Village	Sub-District
1	305310.74	9049521.23	Anggabaya	Penatih	East Denpasar
2	309788.67	9043451.46	Biaung	Kesiman Kertalangu	East Denpasar
3	307169.95	9041473.45	Buaji	Kesiman	East Denpasar
4	308236.77	9042306.97	DlodSema	Kesiman Petilan	East Denpasar
5	305358.56	9042286.62	Kedaton	Sumerta Kelod	East Denpasar
6	305963.94	9046817.61	Paang	Penatih	East Denpasar
7	308501.27	9043994.41	Padanggalak	Kesiman Kertalangu	East Denpasar
8	304482.78	9044161.40	Peraupan Barat	Dangin Puri Kaja	East Denpasar
9	306316.34	9048488.00	Poh Manis	Penatih Dangin Puri	East Denpasar
10	305897.31	9045981.71	Saba	Penatih	East Denpasar
11	306602.01	9047479.65	Taman	Penatih Dangin Puri	East Denpasar
12	307129.64	9045970.76	Temaga	Penatih Dangin Puri	East Denpasar
13	305640.63	9049500.15	Uma Desa	Penatih	East Denpasar
14	305896.39	9049324.27	Uma Layu	Penatih	East Denpasar
15	304734.60	9041103.52	Yang batu	Dangin Puri Klod	East Denpasar
16	303622.38	9048650.51	Dalem	Peguyangan Kaja	North Denpasar
17	305090.09	9048333.78	Kedua	Peguyangan Kangin	North Denpasar
18	305505.68	9047752.89	Lungatad	Peguyangan Kangin	North Denpasar
19	302987.68	9047293.74	Pakel I	Peguyangan Kaja	North Denpasar
20	302202.77	9048477.71	Pakel II	Ubung Kaja	North Denpasar
21	301457.24	9046547.53	Petangan	Ubung Kaja	North Denpasar
22	303571.75	9046873.94	Sembung	Peguyangan	North Denpasar
23	301789.76	9046038.74	Ubung	Ubung	North Denpasar
24	301500.58	9036887.86	Cuculan	Pemogan	South Denpasar
25	307391.01	9038408.89	Intaran Barat	Sanur Kauh	South Denpasar
26	307516.99	9038788.32	Intaran Timur	Sanur Kauh	South Denpasar
27	302319.46	9037748.05	Kepaon	Pemogan	South Denpasar
28	303173.46	9036853.00	Kerdung	Pedungan	South Denpasar
29	305338.49	9039105.17	Panjer	Panjer	South Denpasar
30	306735.37	9038298.02	Renon	Renon	South Denpasar
31	308363.09	9041409.04	Sanur	Sanur	South Denpasar
32	304226.26	9035927.74	Sesetan	Sesetan	South Denpasar
33	306121.78	9037947.55	Sidakarya	Sidakarya	South Denpasar
34	299607.52	9040364.76	Banyukuning	Padangsambian Klod	West Denpasar
35	299991.60	9038014.15	Lange	Pemecutan Klod	West Denpasar
36	299963.71	9038710.86	Mergaya	Pemecutan Klod	West Denpasar
37	300093.89	9046058.59	Pagutan	Padangsambian Kaja	West Denpasar
38	301585.85	9040890.79	Semila	Pemecutan Klod	West Denpasar
39	300664.02	9045808.81	Serogsogan	Padangsambian Kaja	West Denpasar
40	299603.66	9041595.79	Tegal Buah	Padangsambian Klod	West Denpasar
41	300411.86	9039905.39	Tegallantang	Padangsambian Klod	West Denpasar

Note: Coordinates in Universal Transverse Mercator (UTM) Zone 50S

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Table 2: Criteria for Evaluating Soil Chemical Properties

No	Soil Properties	Unit	Criteria				
			Very Low	Low	Moderate	High	Very High
1	C –Organic	%	< 1	1 - 2	2 - 3	3 - 5	> 5
2	Total P_2O_5	mg/100 gr	< 10	10 - 20	21 - 40	41 - 60	> 60
3	Total K_2O	mg/100 gr	< 10	10 - 20	21 - 40	41 - 60	> 60
4	Cation Exchange Capacity	me/100g	< 5	5 - 16	16 - 24	25 - 40	> 40
5	Base Saturation	%	< 20	20 - 35	36 - 50	51 - 70	> 70
	Soil Properties	Very Acid	Acid	Rather Acid	Neutral	Rather Alkali	Alkali
6	pH H_2O	< 4.5	4.5 – 5.5	5.5 – 6.5	6.5 – 7.5	7.5 – 8.5	> 8.5

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Table 3: Soil Fertility Status in Denpasar City

No	Subak Name	Sub-district	Chemical Properties					Fertility Status	Area (Ha)
			CEC	Base Saturation	C-Org	Total P_2O_5	Total K_2O		
1	Anggabaya	East Denpasar	90.2	63.33	1.71	36.43	169.1	Moderate	27.96
2	Blaung	East Denpasar	30.38	55.46	1.26	70.53	214.5	Moderate	10.87
3	Buaji	East Denpasar	28.46	67.09	2.18	19.83	33.3	High	126.25
4	Delod Sema	East Denpasar	27.04	84.64	2.42	37.46	196	High	48.21
5	Kedaton	East Denpasar	31.27	83.64	1.28	20.84	198.2	Moderate	12.90
6	Paang	East Denpasar	38.48	86.54	3.54	41.67	59.3	High	50.45
7	Padanggalak	East Denpasar	94.67	59.18	2.97	61.41	231.3	High	102.82
8	Peraupan Barat	East Denpasar	31.35	83.54	1.48	20.54	198	Moderate	2.74
9	Poh Manis	East Denpasar	90.1	62.33	1.76	36.54	169.2	Moderate	16.30
10	Saba	East Denpasar	33.27	58.27	3.02	24.13	201.5	High	38.30
11	Taman	East Denpasar	33.67	96.21	1.29	15.75	156.9	Moderate	21.63
12	Temaga	East Denpasar	40.23	68.62	2.6	63.35	95.6	High	152.21
13	Uma Desa	East Denpasar	90.2	63.43	1.71	36.33	169.2	Moderate	11.93
14	Uma Layu	East Denpasar	90.3	63.2	1.61	36.53	169	Moderate	24.88
15	Yang batu	East Denpasar	31.36	83.54	1.34	20.93	198.3	Moderate	4.74
16	Dalem	North Denpasar	31.46	66.62	2.54	125.81	106	High	77.71
17	Kedua	North Denpasar	38.87	86.48	3.46	41.68	59.15	High	60.84
18	Lungatad	North Denpasar	38.78	86.74	3.45	41.76	59	High	115.96
19	Pakel I	North Denpasar	32.28	68.38	1.28	52.18	155	Moderate	101.47
20	Pakel II	North Denpasar	34.89	69.87	0.86	31.88	213.6	Moderate	46.55
21	Petangan	North Denpasar	28.58	82.39	2.49	42	199	High	34.41
22	Sembung	North Denpasar	31.23	57.9	1.7	20.44	269	Low	100.49
23	Ubung	North Denpasar	28.47	82.48	2.59	42.3	199.2	High	6.12
24	Cuculan	South Denpasar	37.07	99.63	1.76	18.09	107.5	Moderate	86.07
25	Intaran Barat	South Denpasar	32.37	91.76	2.43	17.87	123.4	High	90.03
26	Intaran Timur	South Denpasar	19.6	98.2	1.29	51.96	78.2	Low	5.69
27	Kepaon	South Denpasar	44.4	72.39	3.07	22.24	97.1	High	115.88
28	Kerdung	South Denpasar	44.45	72.59	3.01	22.28	97.13	High	129.22
29	Panjer	South Denpasar	32.34	97.68	2.65	44.56	123.5	High	12.79
30	Renon	South Denpasar	32	97.67	2.85	44.65	123.6	High	82.54
31	Sanur	South Denpasar	34.25	94.74	1.28	55.51	88.1	Moderate	51.44
32	Sesetan	South Denpasar	37.02	99.58	1.67	18.08	107.5	Moderate	12.50
33	Sidakarya	South Denpasar	35.16	51.63	1.28	35.09	35.9	Moderate	52.28
34	Banyukuning	West Denpasar	36.23	93.89	3.08	28.43	161.35	High	11.37
35	Lange	West Denpasar	44.39	72.35	3.08	22.42	97.3	High	11.37
36	Mergaya	West Denpasar	22.18	53.08	1.25	17.43	209	Low	18.51
37	Pagutan	West Denpasar	37.85	58.83	1.73	34.59	62.4	Moderate	27.54
38	Semila	West Denpasar	37.08	99.83	1.66	18.08	108.9	Moderate	30.78
39	Serogsogan	West Denpasar	28.68	82.29	2.69	42.1	199.1	High	1.25
40	Tegal Buah	West Denpasar	36.23	93.87	3.03	28.33	161.5	High	37.9
41	Tegallantang	West Denpasar	37.05	99.53	1.56	18.05	107.8	Moderate	18.26

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Table 4: Summary of the Soil Fertility Status in Denpasar City

Sub-district	Soil Fertility Status	Area (Ha)	Area (%)	Num. of Subak	Num. of Subak (%)
West Denpasar	High	69.03	3.35	4	9.76
	Moderate	76.58	3.72	3	7.32
	Low	78.70	3.82	1	2.44
South Denpasar	High	430.46	20.91	5	12.20
	Moderate	202.29	9.83	4	9.76
	Low	5.69	0.28	1	2.44
East Denpasar	High	518.23	25.18	6	14.63
	Moderate	133.95	6.51	9	21.95
	Low	0	0,00	0	0.00
North Denpasar	High	295.04	14.33	5	12.20
	Moderate	148.02	7.19	2	4.88
	Low	100.49	4.88	1	2.44
Total		2058.48	100.00	41	100.00

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