Agrotrop : Journal on Agriculture Science, 16(2): 122-133 (2026)
ISSN: 2654-4008 (Online), 2088-155X (Print)
URL: https://ejournal2.unud.ac.id/index.php/agrotrop
DOI: https://doi.org/10.24843/AJoAS.2026.v16.i02.p06
Penerbit: Fakultas Pertanian, Universitas Udayana

Evaluation of Land Suitability for The Development of Fruit Horticultural Crops on Dryland in Banjar Sub- District, Buleleng District

Made Sri Sumarniasih*, Ni Putu Manik Eka Patricia Tarukani, I Made Mega

Faculty of Agriculture, Agroecotechnology Study Program, Udayana University, Jln. PB. Sudirman Denpasar Bali 80232, **Indonesia**

**Corresponding author:* sumarniasih@unud.ac.id

ABSTRACT

Dryland areas in Banjar Sub-District, Buleleng Regency, possess considerable potential for the development of fruit horticultural crops; however, their utilization has not been optimized due to limited information regarding land suitability and appropriate land management practices. This study aimed to evaluate the actual and potential land suitability for fruit horticultural crops, identify the major limiting factors, and formulate land use recommendations to support sustainable agricultural development. The research was conducted from April to August 2025 through field surveys, soil sampling, laboratory analyses, and land evaluation using a matching method between land characteristics and crop growth requirements. The results indicated that the actual land suitability classes ranged from N (not suitable) to S2 (moderately suitable). The major limiting factors included climatic conditions, particularly temperature and rainfall, soil physical properties such as texture and effective soil depth, and low nutrient availability, especially nitrogen *(N),* phosphorus *(P),* and potassium *(K).* Improvement measures through fertilization, application of organic amendments, and drainage management increased the potential land suitability to S2 (moderately suitable) and S1 (highly suitable) classes in several land units. Quantitatively, these improvement measures reduced soil fertility and soil property constraints, thereby increasing the level of land suitability for horticultural crop cultivation on dryland areas. These findings demonstrate that appropriate soil and water management can substantially improve dryland productivity and support sustainable horticultural development and land-use planning in Banjar Sub-District.

Keywords: land use recommendations, land suitability evaluation, limiting factors, horticultural crops

INTRODUCTION

Kecamatan Banjar, Buleleng Regency, is predominantly inhabited by people working in the agricultural sector. However, the dryland areas in this region have not been utilized optimally by farmers, and no land suitability assessment has previously been conducted. Dryland is one of the agroecosystems with considerable potential for agricultural development, including horticultural crops, food crops, and perennial crops. In addition, during the rainy season, dryland also functions as a water catchment area that generates surface runoff. Dryland refers to land that is utilized without permanent or seasonal inundation, with water sources derived primarily from rainfall or limited irrigation. Therefore, the utilization of dryland is highly dependent on rainfall as the main source of water supply for crops. Horticultural crops have substantial development opportunities and high production potential; therefore, these commodities are expected to become one of the leading sectors supporting future economic recovery (BPS Bali Province, 2024). In this study, the horticultural commodities examined were limited to perennial fruit crops.

Fruit horticultural commodities in Banjar District during 2024 to 2025 were dominated by avocado, durian, and banana crops. Avocado production in 2024 reached 110,800 kg and increased to 174,600 kg in 2025. Durian production was recorded at 2,341,500 kg in 2024 and increased to 3,800,900 kg in 2025. Banana production also increased from 1,589,400 kg in 2024 to 2,576,400 kg in 2025. In contrast, mango production experienced a considerable decline, decreasing from 1,028,200 kg in 2024 to 558,700 kg in 2025. Mangosteen production also showed a significant decrease from 969,980 kg in 2024 to 504,500 kg in 2025. Meanwhile, longan production from 2024 to 2025 showed neither an increase nor a decrease and remained at 2 kg (BPS Bali Province, 2025). The decline in productivity of several commodities was presumed to be caused by limiting factors that were not compatible with crop growth requirements.

This condition may result in suboptimal land utilization and potentially lead to the reduction of agricultural land, which ultimately becomes a constraint in agricultural cultivation activities in Banjar District. Based on these conditions, appropriate land management planning through land suitability evaluation is required. Land suitability evaluation is important information in agricultural land development and management because it can be used to identify the main limiting factors and determine suitable land management systems to improve land productivity (Sumarniasih and Antara, 2020). Therefore, this study was conducted to optimize the utilization of dryland in Banjar District, Buleleng Regency, through land suitability assessment for the optimal development of fruit horticultural crops.

MATERIALS AND METHODS

Time and Location

The research was conducted from April to August 2025 in Banjar Sub- district, Buleleng Regency. Soil sample analyses were carried out at the Soil Chemistry and Fertility Laboratory, Faculty of Agriculture, Udayana University.

Material and Tools

The equipment used in this study consisted of field survey equipment, soil sampling equipment, and laboratory analysis instruments. The field survey equipment included a Garmin Global Positioning System (GPS) to determine the coordinates of the study area and soil sampling points, a geological compass to determine field direction and orientation, a measuring tape to measure land length and slope gradient, a clinometer to measure slope steepness, and a digital camera to document land conditions at the study sites. In addition, stationery, field observation sheets, and clipboards were used to record land characteristic data during the field survey.

The soil sampling equipment included a soil auger to collect disturbed soil samples from each Homogeneous Land Unit (HLU), hoes and shovels to assist the soil excavation process, a soil knife to clean the soil profile, and ring samples to collect undisturbed soil samples used for the analysis of soil physical properties, such as bulk density. The collected soil samples were then placed into plastic sample bags and labeled according to the sampling location.

Soil analysis was conducted in the laboratory using several laboratory instruments, including a pH meter for soil pH analysis, a spectrophotometer for available phosphorus (P-available) analysis, a flame photometer for available potassium (K-available) analysis, and a Kjeldahl distillation apparatus for total nitrogen (N-total) analysis. In addition, an analytical balance was used to weigh soil samples and laboratory chemicals, an oven was used to dry soil samples, and a 2 mm soil sieve was used for sample preparation. Measuring cylinders, Erlenmeyer flasks, volumetric pipettes, and other laboratory equipment supporting the analysis of soil physical and chemical properties were also used.

The materials used in this study included the administrative map of Banjar Sub-District, soil type map, slope gradient map, land use map, and rainfall map, which were used in the overlay process for the preparation of Homogeneous Land Units (HLUs). In addition, satellite imagery and secondary data obtained from related institutions were used as supporting materials for spatial analysis and land suitability evaluation. The main research materials consisted of soil samples collected from each HLU within the study area for the analysis of soil physical and chemical properties.

The chemical materials used in the laboratory analysis included pH 4 and pH 7 buffer solutions for pH meter calibration, HCl, H_2SO_4, NaOH, and chemical indicators for total nitrogen analysis using the Kjeldahl method, Bray I solution for available phosphorus analysis, and ammonium acetate (NH_4OAc) solution for cation exchange capacity (CEC) and available potassium analysis. In addition, distilled water was used as a solvent and for cleaning laboratory equipment during the analysis process.

Research Method

This study was conducted using a field survey approach supported by laboratory analysis of soil samples. Soil sampling was carried out within each Homogeneous Land Unit (HLU) using a purposive sampling method, targeting representative land characteristics. The Table 1 presents the sampling points within the study area. Following soil sampling, land suitability evaluation was conducted using a matching approach by comparing land characteristics and land quality with the growth requirements of selected fruit horticultural crops, namely mango, durian, mangosteen, rambutan, banana, avocado, and longan, based on the criteria established by Ritung *et al.,* (2011). The analysis was performed up to the subclass level to identify the main limiting factors and determine appropriate land improvement strategies.

The delineation of Homogeneous Land Units was conducted by integrating slope classes, soil types, and land use through overlay techniques using Geographic Information System (GIS) technology. Field observations were subsequently carried out to verify soil conditions and collect soil samples (Figure 1). These samples were then analyzed in the laboratory to analyze soil physical and chemical properties, including texture, pH, organic carbon content (SOC), total nitrogen (N-total), available phosphorus (P-available), available potassium (K-available), cation exchange capacity (CEC), and salinity. The laboratory analysis results were compiled and used as the basis for determining land suitability classes, producing land suitability maps, and formulating land use recommendations to support sustainable land management.

Table 1. Homogeneous Land Units in the Research Area of Banjar District

No.	Land Mapping Unit (LMU)	Village Name	Soil Type	Slope Gradient	Land Use	Land Area (ha)
1	LMU I	Gobleg A	Brown Andosol	15 to 25 %	Mixed garden	2,065.50
2	LMU II	Munduk B	Brown Andosol	25 to 40 %	Mixed garden	1,026.02
3	LMU III	Tigawasa	Brown Latosol	15 to 25 %	Mixed garden	3,928.71
4	LMU IV	Gobleg B	Brown Latosol	25 to 40 %	Mixed garden	974.62
5	LMU V	Banyuatis	Brown Regosol	15 to 25 %	Mixed garden	251.66
6	LMU VI	Tirtasari	Brown Regosol	8 to 25 %	Mixed garden	242.02
7	LMU VII	Munduk C	Brown Regosol	15 to 25 %	Mixed garden	117.73
8	LMU VIII	Sidetapa	Brown Latosol	15 to 25 %	Dryland farming	1,537.76

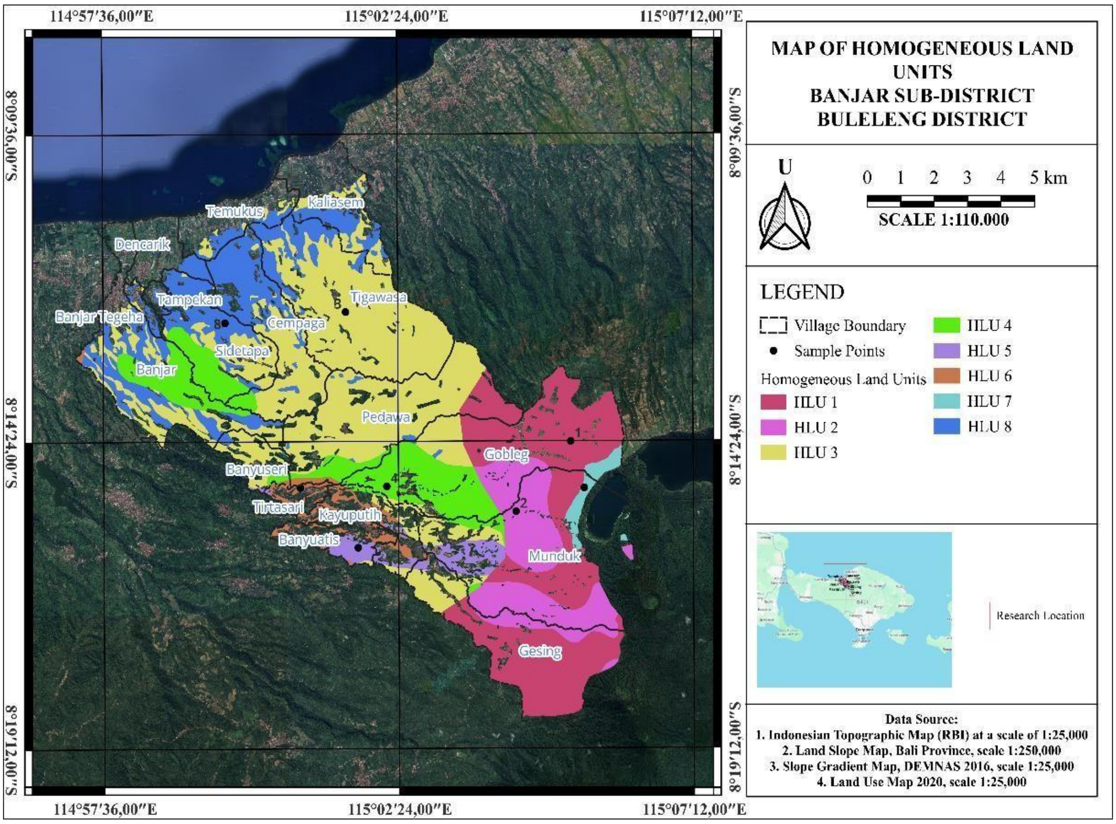

Figure 1. Map of the Research Location and Homogeneous Land Units

RESULTS AND DISCUSSION

Results

Land suitability was evaluated using soil chemical properties and land characteristics that involved comparing land characteristics and qualities with crop growth requirements, referring to the criteria developed by Ritung *et al.,* (2011). The classification of land suitability. The study classified data obtained from field observations, which were further supported by laboratory analysis of soil samples. The parameters used as the basis for this evaluation are summarized in Table 2. The results of the assessment reveal that dryland areas in Banjar Sub-district are constrained by several limiting factors that affect the potential development of fruit horticultural crops.

Discussion

Based on the results of the land suitability evaluation in Banjar Sub-District, the study area was divided into eight Homogeneous Land Units (HLUs), namely HLU I (Gobleg A), HLU II (Munduk B), HLU III (Tigawasa), HLU IV (Gobleg B), HLU V (Banyuatis), HLU VI (Tirtasari), HLU VII (Munduk C), and HLU VIII (Sidetapa). Each HLU exhibited different land characteristics, limiting factors, and levels of actual and potential land suitability for the development of fruit horticultural crops.

HLU I (Gobleg A) covered an area of approximately 2,065.50 ha and had relatively favorable land conditions for the development of fruit horticultural crops. The evaluation results indicated that the actual land suitability class in HLU I was generally classified as S2 (moderately suitable). The main limiting factors in this area were nutrient retention (nr), nutrient availability (na), and rooting conditions (rc). Low nutrient contents, particularly nitrogen and phosphorus, resulted in suboptimal plant growth. In addition, soil texture and effective soil depth at several locations also limited root development. After improvement measures were implemented, including the addition of organic matter, fertilization using urea and SP-36, and improved water management, the potential land suitability class increased to S2 (moderately suitable) to S1 (highly suitable). Based on the evaluation results, HLU I was suitable for the development of mango, avocado, and longan because these commodities were able to adapt to the climatic conditions and soil characteristics of the area.

HLU II (Munduk B) covered an area of approximately 1,026.02 ha and had a more humid climatic condition compared with the other HLUs. The actual land suitability class in this area was classified as S2 (moderately suitable), with the main limiting factors consisting of temperature (tc), water availability (wa), nutrient retention (nr), and nutrient availability (na). Relatively high rainfall accelerated nutrient leaching, resulting in lower soil nutrient content. Land improvement through the addition of organic matter and fertilization increased nutrient availability, thereby improving the potential land suitability class to S2 (moderately suitable) to S1 (highly suitable). The more humid climatic conditions made HLU II suitable for the development of mango, mangosteen, durian, and rambutan. These crops require adequate water availability and higher air humidity to support plant growth and fruit production.

HLU III (Tigawasa) was the largest land unit, covering approximately 3,928.71 ha. The evaluation results showed that the actual land suitability class in this area was classified as S2 (moderately suitable), with the main limiting factors consisting of rooting conditions (rc), nutrient retention (nr), and nutrient availability (na). Relatively coarse soil texture reduced the soil capacity to retain water and nutrients. In addition, the low soil organic matter content also affected soil fertility. Following improvement measures through the application of organic matter and fertilization, the potential land suitability class increased to S1. This area had high potential for the development of mango, avocado, and longan because the climatic and topographic conditions supported the growth of these commodities. Furthermore, these crops were relatively tolerant of the dryland conditions found in HLU III.

HLU IV (Gobleg B) covered an area of approximately 974.62 ha, with the actual land suitability class classified as S2 (moderately suitable). The main limiting factors in this area were rooting conditions (rc), nutrient retention (nr), and nutrient availability (na). Suboptimal soil texture and effective soil depth limited plant root development. In addition, low nutrient content reduced the productivity of fruit horticultural crops. Through the addition of organic matter and fertilization, soil fertility conditions improved, resulting in an increase in the potential land suitability class to S2 (moderately suitable) to S1 (highly suitable). Based on the evaluation results, HLU IV was suitable for the development of mango, rambutan, and mangosteen. These crops were able to grow relatively well under the climatic conditions and soil characteristics of the area.

HLU V (Banyuatis) covered an area of approximately 251.66 ha, with an actual land suitability class of S2 (moderately suitable). The main limiting factors in this area were water availability (wa), nutrient retention (nr), and nutrient availability (na). Soil conditions at several locations had low water retention capacity, causing crops to be susceptible to water deficiency during the dry season. In addition, the soil nutrient content remained relatively low. After improvement measures through water management, addition of organic matter, and fertilization, the potential land suitability class increased to S2 (moderately suitable) to S1 (highly suitable). Based on the evaluation results, HLU V was suitable for the development of mango, durian, rambutan, and banana. Banana was considered moderately suitable for development in this area because it requires relatively moist and fertile soil conditions.

HLU VI (Tirtasari) covered an area of approximately 242.02 ha and had a relatively lower level of land suitability compared with the other HLUs. The actual land suitability class in this area ranged from N (not suitable) to S2 (moderately suitable), with the main limiting factors consisting of rooting conditions (rc), temperature (tc), and water availability (wa). Shallow effective soil depth restricted plant root development. In addition, the climatic conditions in this area were less suitable for several fruit horticultural crops. Improvement measures through the addition of organic matter and water management increased the potential land suitability class to S2 (moderately suitable). Based on the evaluation results, HLU VI was more suitable for the development of mango and longan because these crops were relatively more tolerant of dryland conditions and limitations in rooting condition.

HLU VII (Munduk C) covered an area of approximately 117.73 ha, with the actual land suitability class ranging from N (not suitable) to S2 (moderately suitable). The main limiting factors consisted of temperature (tc), rooting conditions (rc), and water availability (wa). The topographic conditions and shallow soil depth in this area limited the capacity of the land to support plant growth. In addition, uneven rainfall distribution also affected water availability for crops. Following improvement measures through water management and fertilization, the potential land suitability class increased to S2 (moderately suitable). The crops recommended for this area were mango and longan because these crops exhibited relatively good adaptability to the land conditions in HLU VII.

HLU VIII (Sidetapa) covered an area of approximately 1,537.76 ha, with the actual land suitability class ranging from N (not suitable) to S2 (moderately suitable). The main limiting factors included temperature (tc), rooting conditions (rc), and nutrient availability (na). Unsuitable soil texture and low nutrient content resulted in suboptimal crop productivity. In addition, several locations had limited soil depth, which restricted root development. After improvement measures through fertilization, addition of organic matter, and improved land management, the potential land suitability class increased to S2 (moderately suitable). Based on the evaluation results, HLU VIII was suitable for the development of mango and longan because these commodities were more adaptable to dryland conditions with limitations in rooting conditions.

Overall, the evaluation results indicated that each HLU in Banjar Sub-District had different potential for the development of fruit horticultural crops according to its land characteristics (Figure 2). The main limiting factors identified included temperature, water availability, rooting conditions, nutrient retention, and nutrient availability. Most of these limiting factors could still be improved through appropriate land management practices, resulting in higher potential land suitability classes compared with the actual land suitability conditions.

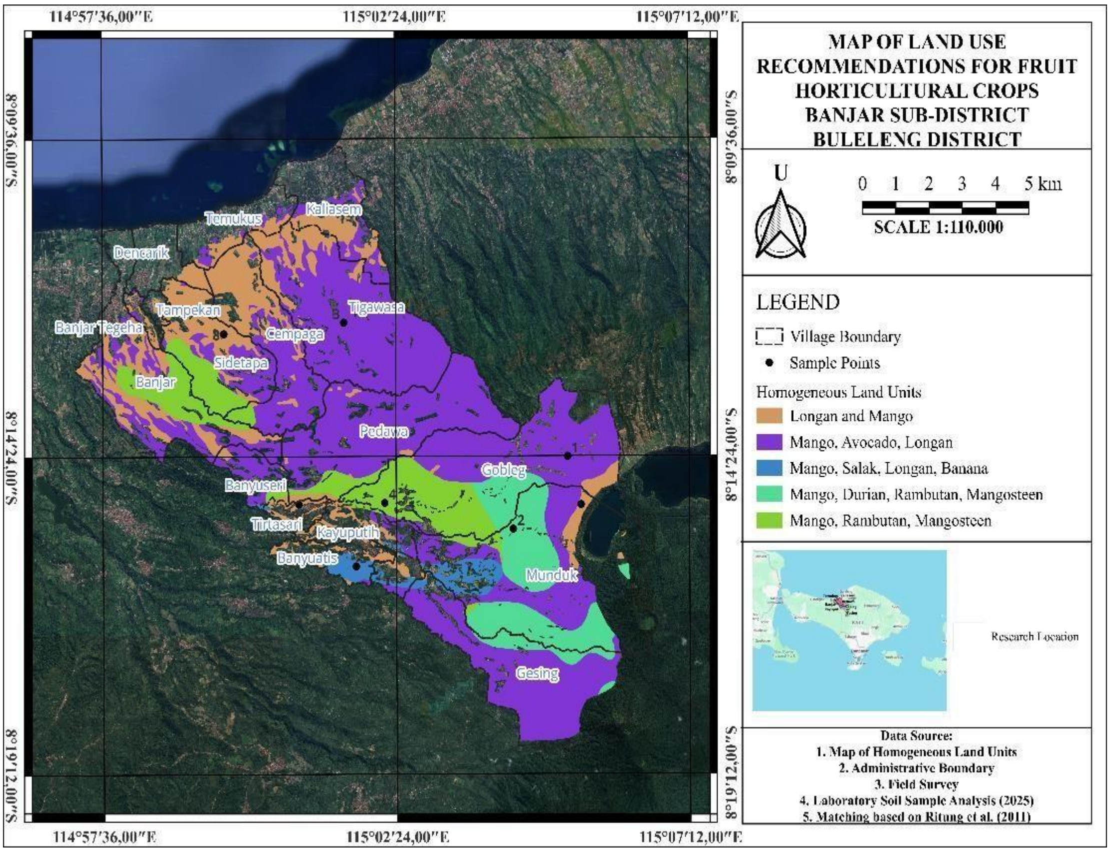

Figure 2. Land Use Direction Map for Banjar District

Table 2. Data on Land Quality/Characteristics in the Research Area

No	HLU	Village	Temp (°C)	Rainfall (mm/year)	Drainage	Texture	Soil Depth (cm)	Coarse Fragments (%)	CEC (me/100g)	Base Saturation (%)	pH (H_2O)	Organic C (%)
1	HLU I	Gobleg A	20.8	2,137	Good	Clay loam	100	<15	32.84	32.25	6.45	2.34
2	HLU II	Munduk B	20.8	2,137	Good	Clay loam	110	<15	45.51	37.31	6.52	2.18
3	HLU III	Tigawasa	22.7	2,137	Good	Clayey loam	70	<15	70.10	43.88	7.03	1.18
4	HLU IV	Gobleg B	20.8	2,137	Good	Clay	80	<15	75.74	39.65	6.81	3.20
5	HLU V	Banyuatis	18.8	2,137	Good	Clay	120	<15	66.21	34.31	6.49	2.77
6	HLU VI	Tirtasari	23.9	2,137	Good	Clay	70	<15	79.45	45.59	6.38	2.71
7	HLU VII	Munduk C	20.0	2,137	Good	Clayey loam	100	<15	45.46	28.73	6.42	2.97
8	HLU VIII	Sidetapa	22.7	2,137	Good	Clayey loam	50	<15	226.42	11.44	6.66	2.52

Table 2. Next

No	HLU	Village	N-Total (%)	Available P (mg/100g)	Available K (mg/100g)	Slope (%)	Erosion Hazard	Flood Height (cm)	Flood Duration (days)	Surface Rock (%)	Rock Outcrop (%)
1	HLU I	Gobleg A	0.05	0.35	21.71	15–25	Moderate	0	0	<5	<5
2	HLU II	Munduk B	0.04	0.40	21.31	25–40	Slightly Moderate	0	0	<5	<5
3	HLU III	Tigawasa	0.38	0.12	23.14	15–25	Moderate	0	0	<5	<5
4	HLU IV	Gobleg B	0.04	0.19	14.29	25–40	Slightly Moderate	0	0	<5	<5
5	HLU V	Banyuatis	0.04	0.20	22.98	15–25	Moderate	0	0	<5	<5
6	HLU VI	Tirtasari	0.03	0.11	17.75	8–15	Slight	0	0	<5	<5
7	HLU VII	Munduk C	0.03	0.07	120.58	15–25	Moderate	0	0	<5	<5
8	HLU VIII	Sidetapa	0.04	0.30	24.68	15–25	Moderate	0	0	<5	<5

Nb: SR = Very Low / Very Slight (erosion); R = Low;S = Moderate;T = High;ST = Very High;N = Neutral;AA = Slightly Alkaline;h = Fine;ah = Moderately Fine;ak = Moderately Coarse;k = Coarse.

CONCLUSION

The land suitability evaluation results showed that the dryland areas in Banjar Sub-District, Buleleng Regency had actual land suitability classes ranging from N (not suitable) to S2 (moderately suitable), with most land units classified as S2 (moderately suitable). The main limiting factors affecting land suitability included temperature (tc), water availability (wa), rooting conditions (rc), nutrient retention (nr), and nutrient availability (na), particularly the low contents of total nitrogen (N-total), available phosphorus (P-available), and available potassium (K-available). In addition, several land units also exhibited limitations related to soil texture, effective soil depth, slope gradient, and erosion hazard potential, which affected the growth and productivity of fruit horticultural crops. The evaluation results indicated that HLU I (Gobleg A), HLU II (Munduk B), HLU III (Tigawasa), HLU IV (Gobleg B), and HLU V (Banyuatis) generally had actual land suitability classes of S2 (moderately suitable), with limiting factors that could still be improved through appropriate land management practices. Meanwhile, HLU VI (Tirtasari), HLU VII (Munduk C), and HLU VIII (Sidetapa) had lower land suitability classes, ranging from N (not suitable) to S2 (moderately suitable), due to more dominant limitations related to rooting conditions, water availability, and soil physical properties. The implementation of land improvement measures, including the addition of organic matter, fertilization using urea, SP-36, and NPK fertilizers, improvement of soil nutrient retention, water management, drainage improvement, and the application of soil conservation practices on sloping land, was able to increase the potential land suitability classes to S2 (moderately suitable) up to S1 (highly suitable) in most land units. Permanent limiting factors such as temperature and soil texture remained difficult constraints to improve; therefore, crop selection needed to be adjusted according to local land characteristics. Based on the results of the land suitability evaluation and land use direction analysis, mango and longan were identified as the most adaptable commodities for development on dryland areas in Banjar Sub-District because they demonstrated better tolerance to limited water availability, moderate rooting condition constraints, and the ability to grow across most homogeneous land units. HLU I and HLU III were suitable for the development of mango, avocado, and longan; HLU II was suitable for mango, mangosteen, durian, and rambutan; HLU IV was suitable for mango, rambutan, and mangosteen; HLU V was suitable for mango, durian, rambutan, and banana; while HLU VI, HLU VII, and HLU VIII were more suitable for mango and longan. The results of this study can be used as a basis for formulating land use directions and developing fruit horticultural crops optimally, effectively, and sustainably on dryland areas in Banjar Sub-District, Buleleng Regency.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to the Research and Community Service Institute (LPPM) of Udayana University for providing financial support through the SAR research grant, and also to the two supervisors, Prof. Dr. Ir. Made Sri Sumarniasih, M.S. and Prof. Dr. Ir. I Made Mega, M.S., who have provided assistance and guidance so that this research could be conducted smoothly and achieve the expected results.

REFERENCES

Alim, N., Simarmata, M., Gunawan, B., Purba, T., Herawati, J., Firgiyanto, R., & Inayah, N. A. (2022). Pengelolaan lahan kering. In A. Karim (Ed.), *Pengelolaan lahan kering*. Yayasan Kita Menulis.

Ariawan, I. M. R., Thaha, A. R., & Prahastuti, S. W. (2016). Pemetaan status hara kalium pada tanah sawah. *Journal Agrotekbis, 4*(1), 43–49.

Arsyad, S., & Nugroho, K. (2016). *Konservasi tanah dan air untuk pengelolaan lahan kering*. IPB Press.

Asril, M., Nirwanto, Y., Purba, T., Mpia, L., Rohman, H., Siahan, A. S., Junairah, E., Sudarmi, N., Mahyati, & Mazlina. (2022). *Ilmu tanah*. Yayasan Kita Menulis.

Balai Pengujian Standar Instrumen Tanah dan Pupuk. (2023). *Petunjuk teknis analisis kimia tanah, tanaman, air dan pupuk* (Edisi ke-3). Kementerian Pertanian Republik Indonesia.

BPS Provinsi Bali. (2023). *Statistik hortikultura Provinsi Bali*. Badan Pusat Statistik Provinsi Bali.

Dibia, I. N. (2015). *Evaluasi kesesuaian lahan untuk pengembangan tanaman kayu putih (Melaleuca leucadendra) pada kawasan hutan produksi Bali Barat (Kecamatan Gerokgak) Kabupaten Buleleng Bali* [Undergraduate thesis, Universitas Udayana].

Rai, I. N., Wijaya, I. N., Wirya, I. G. N., Widhiantini, N. M., Wijana, G., Wiraatmaja, I. W., Yudha, I. K., & Utama, W. (2023). *Jeruk keprok Tejakula: Potensi dan peluang pemulihannya di tengah endemi CVPD dengan teknologi budidaya sehat*. Deepublish.

Ritung, S., Nugroho, K., Mulyani, A., & Erna, S. (2011). *Petunjuk teknis evaluasi lahan untuk komoditas pertanian* (Edisi pertama). Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian, Badan Penelitian dan Pengembangan Pertanian, Kementerian Pertanian.

Rupa, C. J. (2022). *Analisis ketersediaan unsur hara nitrogen dan bahan organik di bawah tegakan uru (Elmerrillia ovalis) dan kebun kopi (Coffea sp.) di Kelurahan Tagari, Kecamatan Balusu, Kabupaten Toraja Utara* [Undergraduate thesis, Universitas Hasanuddin].

Saifulloh, M., Sardiana, I. K., & Supadma, A. A. (2017). Pemetaan kualitas tanah pada lahan kebun campuran dengan sistem informasi geografis (SIG) di Kecamatan Tegalalang, Kabupaten Gianyar. *E-Jurnal Agroekoteknologi Tropika, 6*(3), 269–278.

Sentana, I. K. A. W., Dibia, I. N., & Trigunasih, N. M. (2021). Evaluasi kesesuaian lahan beberapa komoditas tanaman hortikultura berbasis sistem informasi geografis di kawasan Subak Kecamatan Denpasar Barat. *Jurnal Agroekoteknologi Tropika, 10*(3), 378–387.

Sidabutar, F., Trigunasih, N. M., & Sumarniasih, M. S. (2023). Evaluasi kesesuaian lahan untuk pengembangan tanaman konservasi dan perkebunan di DAS Unda, Provinsi Bali, Indonesia. *Agro Bali: Agricultural Journal, 6*(3), 852–859.

Siregar, C. A. T., Trigunasih, N. M., & Dibia, I. N. (2020). Kesesuaian lahan tanaman buah-buahan dan perkebunan berbasis sistem informasi geografis pada lahan kering di DAS Yeh Ho Kabupaten Tabanan. *Jurnal Agroekoteknologi Tropika, 9*(3), 153–165.

Subagyono, K., & Dariah, A. (2016). Peningkatan produktivitas lahan kering melalui inovasi teknologi konservasi tanah dan air. *Jurnal Litbang Pertanian, 35*(3), 129–138.

Sumarniasih, M. S., Antara, M., & Zebua, S. A. B. (2022). Evaluasi kesesuaian lahan kering untuk tanaman pangan di Kecamatan Kubutambahan Kabupaten Buleleng. *Enviro Scienteae, 18*(1), 44–60.

Sumarniasih, M. S., & Antara, M. (2021). Suitable dryland management strategy in Buleleng Regency of Bali, Indonesia. *Journal of Dryland Agriculture, 7*(5), 88–96.

Sumarniasih, M. S., & Antara, M. (2020). Land suitability for food crops and plantations in Bangli Regency Province Bali-Indonesia. *Plant Archives, 20*(1), 1693–1701.

Yustika, A. E., & Firmansyah, E. (2022). Optimalisasi pemanfaatan lahan kering untuk pengembangan hortikultura berkelanjutan. *Jurnal Agroekoteknologi, 10*(2), 112–121.