Research Article

Evaluation of Land Suitability for Clove (*Eugenia Aromantica* L) and Nutmeg (*Myristica Fragrans* Houtt) in Nusalaut Island Central Maluku Regency

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**ABSTRACT**

This research aimed to obtain land characters and qualities data and to determine land suitability for clove and nutmeg and their spatial distribution in Nusalaut Island, Central Maluku Regency. The results showed that the land suitability for clove are marginally suitable (S3) with the coverage area is 1452.38 ha or 66.51%, and the limiting factors are water availability and nutrient retention (wa, nr) limiting factors and unsuitable class (N) of 731.52 ha or 33.50 %. While the land suitability for nutmeg are moderate suitable (S2) with root media and nutrient retention (rc, nr) limiting factors and the coverage area is 123.75 ha or 5.66%, S2nr of 409.93 ha or 18.77%, slope (S2eh) limiting factor with the coverage area is 918.7 ha or 42.1% and the unsuitable class (N) with the area of 731.52 ha or 33.50 %. The land suitability of the clove and nutmeg is located in the Other Used-Areas (APL) with the area of 2183.63 ha, while total land units in the study area is 2697 ha.

**Keywords:** Cloves, Land Evaluation, Land Suitability, Nutmeg, Nusalaut Island

**Introduction**

The increasing need for land and the scarcity of fertile and potential agricultural land, as well as competition for land use between agricultural and non-agricultural sectors, requires appropriate technology in an effort to optimize land use in a sustainable manner. In order to be able to optimally utilize land resources in an appropriate and efficient manner, data and information regarding soil, climate and other physical characteristics of the environment, as well as requirements for plant growth are needed (Ahmed et al., 2022).

Aspects of land that always have a direct influence on an agricultural development are very closely related, with external and internal conditions (Zeng et al., 2022). These conditions include topography, elevation, slope, drainage, water and soil characteristics (Hariyadi et al., 2019). These factors are the main basis for assessing land suitability whether it is suitable or not suitable for a land use plan (Syeda et al., 2022).
The increase in population and ongoing development activities have resulted in a reduction in the area of productive agricultural land due to land conversion for various needs (Deribe, 2021). Efforts to increase agricultural production in an area require the integration of all productive factors such as natural resources in the form of land, water, and climate (Mariuzza et al., 2022; Shekari et al., 2019).

Observing the survival of the farmers in Central Maluku Regency, especially the customary lands located on the Lease Islands, (Saparua, Haruku and Nusalaut), Seram and Ambon who control a plot of farming land for generations with the title dusung, a form of land use agroforestry (Addharu et al., 2022). The application of agroforestry plant composition aims to maintain the ecological function of forests and increase farmers’ income (Haque et al., 2021). Agroforestry has ecological functions such as providing water sources, preventing erosion and landslides from trees on managed land (Ghodszad et al., 2022). However, with a management system that is still traditional without the adoption of modern agricultural technology, hamlet land has not been able to provide adequate economic support for the lives of farming families. Particularly on Nusalaut Island, the agroforestry plants that are commonly planted are cloves and nutmeg (Pickova et al., 2020).

Nusalaut Island is part of the Lease Islands apart from Saparua and Haruku Islands which are one of the small islands in Maluku Province, Central Maluku Regency, where until now information regarding data on land aspects and other land resources is still very limited. As is the case with other small islands in Maluku Province, in order to provide data related to information on land resources, it is necessary to carry out a research activity (Zachariah & Leela, 2018).

This study aims to: (1) Obtain data and information about the characteristics and quality of land on Nusalaut Island. (2) Establish land suitability classes and their distribution in Nusalaut Island for the development of agricultural commodities, especially clove and nutmeg commodities. (3) Producing land suitability class maps for clove and nutmeg commodities (Wen et al., 2022).

**Methods**

The tools and materials used in this research were Topographic Maps, Geological Maps, Administrative Maps, compasses, abney levels/clinometers, altimeters, soil drills, description cards of soil properties in the field, soil pH, GPS, digital cameras, meters, field knife, stationery and laptop with ArcGIS program (Basir et al., 2018). The research method used was a survey method with an analytical approach and the observation distance used was a free survey with a boring type of observation and a complete profile (Ji et al., 2020).

The research procedure was carried out in three stages, namely: the preparation stage, the field work stage, and the report preparation stage (Rahmi et al., 2021a).

In the preparatory phase, information gathering activities related to research activities are carried out, such as searching for maps, analyzing topographic maps, geological maps and land cover maps to obtain land unit maps that are used as field work maps, preparing field survey equipment in the form of tools and materials, surveys and administrative data for the smooth running of field survey activities, in the form of cover letters and others according to research needs. The Land Use Map was obtained based on the analysis of
Preparation of Land Unit Maps (PSL) through the process of superimposing thematic maps resulting from the analysis of geological maps, slope class maps, land cover and land use maps (LASAIBA, 2023).

The field work was carried out through detailed observation based on land units map 1:50,000 scale, and field observation and data collecting was conducted by using free survey observation distances (free survey) in all sample areas with boring and profiles observations.

**Result and Discussion**

Nusalaut Island is located between 3° 42′ 5.36″ - 3° 39′ 16.07″ South Latitude and 128° 45′ 10.17″ - 128° 48′ 22.5″ East Longitude. Geographically, the North of Nusalaut Island is bordered by Saparua Island, the South is bordered by the Banda Sea, the East is by the Seram Sea and the West is bordered by Molana Island. Administratively, the Nusalaut Island region is one of 5 (five) sub-districts within the Central Maluku Regency, Maluku Province which has 7 (seven) countries with a total land area of 32.50 km² (Khikmah & Gamaliel, 2018).

The results of Arcgis measurements of Nusalaut Island have a total area of 2697 ha consisting of 2183.63 ha of other use areas (APL) and 513.38 ha of protected forest (HL).

The research area has a rainfall of 3,336 mm/year with an average air temperature of 26.60°C, has a climate type A (Q= 10.04%), which is a very wet area with tropical rain forest vegetation (Laimeheriwa, S. 2015). climate is one of the determining factors for achieving optimal plant growth/production (Bhunia et al., 2023).

The topographic condition of Nusalaut Island has a complex regional shape and consists of several regional form units. With geological formations of uplifted coral reefs and tuff brickey lava with soil types found according to the national soil classification and equivalent are Regosol (Psamments), Gleisol (Aquepts), Litosol (Orthents), Cambisol (Udepts), and Latosol (Udepts) (Wang et al., 2019).

Based on the results of field observations and chemical data on soil fertility status obtained from laboratory analysis, then compared to land characteristics and plant growth requirements, the land suitability class for clove and nutmeg commodities were obtained (Rahmi et al., 2021b). as presented in Table 1 below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Land Unit</th>
<th>Class</th>
<th>Sub Class</th>
<th>Limiting Factor</th>
<th>Class</th>
<th>Sub Class</th>
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<td>S1</td>
<td>S2a, nr</td>
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<tr>
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<td>S2a, nr</td>
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<td>S1</td>
<td>S2a, nr</td>
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<td>S1</td>
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<td>S2c, nr</td>
<td>Erosion hazard</td>
<td>S1</td>
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<td>S2c, nr</td>
<td>Erosion hazard</td>
<td>S1</td>
<td>S2a, nr</td>
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<td>Erosion hazard</td>
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<td>L25</td>
<td>S2</td>
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<td>L27</td>
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<td>L28</td>
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</tbody>
</table>

Based on the data in Table 1 above, the results of the assessment of land suitability class for clove and nutmeg commodities are as follows: Assessment into class and sub-class of
clove plant land suitability is according to marginal (S3) area, 1452.38 ha or 66.51%, with a factor limiting water availability and nutrient retention (wa, nr) and for class not suitable (N) an area of 731.52 ha or 33.50% (Jia et al., 2019).

As for the land suitability class for nutmeg plants, it is quite suitable (S2) covering an area of 123.75 ha or 5.66% with limiting factors for root media and nutrient retention (rc, nr), S2nr covering an area of 409.93 ha or 18.77%, S2eh limiting factor for slopes covering an area of 918.7 ha or 42.1% and for class not appropriate (N) area of 731.52 ha or 33.50% (Gayathri et al., 2021).

The distribution can be seen on the map below:
the land at the research location with the criter-
ria for land use requirements used (Gruda,
2022).

Conclusion
Based on the results of the research that has
been described, the following conclusions can
be drawn:

1) The characteristics of the land found are:
good and rather poor drainage, texture
consisting of coarse, medium to slightly
fine, with very shallow to deep effective
depths, slopes including flat to steep,
erosion conditions occur as a result of
human influence. Meanwhile, the land quality
The results found were: Soil reaction (pH)
5.9 – 7.5 slightly acidic to neutral, very low
to moderate CEC (2.3 me/100g – 24.4
me/100g), very low to very high KB
(22.6% - 100%), material content Organic
ranges from very low to high (0.6% -
4.9%).

2) Based on the results of the land suitability
class and sub-class assessment for clove
commodities, the suitability class S3 and N
was obtained with the suitability sub-class
S3wa, nr with the limiting factors of water
availability ( wa) and nutrient retention
(nr). As for the nutmeg commodity, land
suitability class values S2 and N were
obtained with suitability sub-classes S2rc,
nr, S2nr, and S2eh with the limiting factors
found being rooting media (rc), nutrient
retention (nr) and erosion hazard (eh).

3) The land suitability map for clove
commodities according to the marginal
(S3) area is 1452.38 ha or 66.51%, and for
the unsuitable class (N) it is 731.52 ha or
33.50%. While the nutmeg commodity is
quite suitable (S2) covering an area of
1,452.38 ha or 66.51%, and for the
unsuitable class (N) covering an area of
731.52 ha or 33.50%.

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