

Evaluation of Land Resource for Development of Sorghum Plants in The Pantai Gemi Village District Stabat

Evaluasi Sumber Daya Lahan Untuk Pembangunan Tanaman Sorghum Di Desa Pantai Gemi Kabupaten Stabat

Risnawati*, Mukhtar Yusuf, Rini Susanti

Agrotechnology Study Program, Muhammadiyah University of North Sumatra Medan, Indonesia

*Corresponding Author: risnawati@umsu.ac.id.

ABSTRACT.

The purpose of this study is to find the location of the land that is suitable or appropriate for sorghum plants seen at the level of the land suitability class are grouped in 5 classes of suitability, namely S1 (highly suitable), S2 (quite appropriate), S3 (marginal suitable), N1 (not appropriate at this time), and N2 (not as permanent). The results of the external scientific minimum in accredited national journals which have an ISSN, the results of the research done to get that to plant sorghum can be developed in fields of agricultural village beach gemi district stabat kabupaten langkat with attention to some aspects of (1) the availability of excessive water can be done making drainage and (2) retention of nutrients; pH that is slightly sour can be improved by the administration of lime sedangkann low C organic can be corrected with the provision of organic matter can improve the nutrient content increased in the soil.

Keywords : Analysis of resources land and plant sorghum

ABSTRAK.

Tujuan dari penelitian ini adalah untuk mengetahui letak lahan yang sesuai atau sesuai untuk tanaman sorgum dilihat pada tingkat kelas kesesuaian lahan yang dikelompokkan dalam 5 kelas kesesuaian, yaitu S1 (sangat sesuai), S2 (cukup sesuai) , S3 (cocok marginal), N1 (tidak sesuai untuk saat ini), dan N2 (tidak permanen). Hasil penelitian minimal ilmiah eksternal pada jurnal nasional terakreditasi yang memiliki ISSN, hasil penelitian yang dilakukan untuk mendapatkan bahwa menanam sorgum dapat dikembangkan di bidang pertanian desa pantai gemi kecamatan stabat kabupaten langkat dengan memperhatikan beberapa aspek (1) ketersediaan air yang berlebihan dapat dilakukan pembuatan drainase dan (2) retensi hara; pH yang agak asam dapat diperbaiki dengan pemberian jeruk nipis sedangkann organik C rendah dapat diperbaiki dengan pemberian bahan organik dapat meningkatkan peningkatan kandungan hara dalam tanah.

Kata kunci: Analisis sumberdaya lahan dan tanaman sorgum

INTRODUCTION

Efforts to boost rice production, it seems not an easy thing. As we know, in the last two decades, there has been a transfer of agricultural land conversion in bulk. According to the data of the National Land Agency (BPN) about 81.176 hectares of agricultural land in Java Island has been transformed into a residential area and the industry, not to mention the other areas (Data and Information Center Agriculture ,2018).

This fact shows riskannya national food security if only rely on one commodity, namely rice. Because that effort is the development of alternative food based on tubers, tree crops or grains, becomes very important. Sorghum is one of the main options.

Sorghum has a nutritional value far superior than rice. The protein content of one gram of sorghum turns out a 1.6-fold than rice. Sorghum also has a high content of iron is 5.5 times more than the rice, 2,05 times the phosphorus, of 3.1 times

the vitamin B1, a 4.7-fold of fat and 4.6-fold calcium (Sirappa, 2003).

The condition of the area the coastal Village of Gemi is located at a height of 4 above sea level with maximum temperature range of 35 0C and a minimum temperature of 21 0C, annual rainfall of 15 mm. The territory of the Village Beach Gemi bertofografi plains and this makes it a region that has potential as the area of Agribusiness and Agro-Industry. The Village Beach Gemi has a river flow like a river Wampu, sungai Blengking and river dredges. From the description of the above conditions, then in general the District Stabat has the potential as follows:

- a. Plantations, the plant form, org palm oil, sugar cane, cocoa are cultivated in private and community.
- b. Food crops, specialized crops rice, beans, corn and vegetables.
- c. A growing industry is folk crafts, such as woven mats purun, usaha pisang sale, making tofu, and industry crafts other household.
- d. The excavated material C in the form of sand and gravel.
- e. Center of trade and services.

The demand for land is increasing, the scarcity of fertile agricultural land and potential, as well as competition for land use between agriculture and non-agriculture, require appropriate technology in an effort to optimize land use in a sustainable manner. To be able to utilize land resources in a focused and efficient necessary data available and complete information regarding the state of the climate, the soil and the nature of the physical environment, as well as the growing requirements of the plant cultivated, especially plants that have market opportunities and the economic sense is quite good.

Data on climate, soil, and physical properties of the environment that influence plant growth as well as to aspects of management need to be identified through survey activities and mapping resources.

Data on land resources is necessary primarily for the benefit of development planning and agricultural development. The Data resulting from the activities of survey and mapping of land resources is still difficult to be used by the user (users) to a plan without having done interpretation for specific purposes.

The Method Of Implementation

The place and Time

The research was conducted in the coastal Village of Gemi Sub district Stabat Langkat District, North Sumatra Province at a height of \pm 30 m above sea level. This research was conducted in the month of December until December 2020.

Materials and Tools

The materials used in this study are : a Map of the Village Beach Gemi.

The tools used in this study are : GPS, ground Drill, ring samples, fiber box, plastic packing sizes of 1 kg, gum, name tags, markers, scrub, meter, calculator, Laptop and stationery.

Research Methods

This research using survey method by direct observation in the field with the sampling using the technique of Stratified random sampling. For testing and measurement parameters as well as laboratory analysis.

Data collected to assess the suitability of land for sorghum plants were divided into two groups:

- a) Primary Data includes, effective soil depth, rock surface, rock outcrops, soil drainage, soil Ph, the levels of CEC, Levels of total N, P2O5 content, Salinity, soil texture, degree of erosion, flood, inundation and slope.
- b) Secondary Data include; Topography map, Geology map, soil map, map of the administrative scale of 1:50,000, rainfall data, population data and data on the use of land

RESULT AND DISCUSSION

The suitability of land For Sorghum Cultivation

Evaluation of land suitability in each land unit of commodity sorghum in the coastal Village of Gemi Sub District Stabat, District Langkat was conducted based on the comparison (matching) between land characteristics with the requirements of the growing crops of sorghum as follows :

1 Temperature

Temperature is the degree of heat or cold measured by a certain scale using a thermometer. The air temperature in a place is influenced by the height of the place. Braak in Kartasapoetra, (2006) gives the formulation that the higher the place above sea level then the temperature will be more low.

$t_0 = (26,3 - 0,61 h)0C$ Description:

t = average temperature of 26.3 = average annual temperature at a height of 0 m above sea level. 0,61 = decrease in temperature for every increase of 100 m

H = the height of a place Based on the formulation, the temperature of the study area can be calculated according to the height. The coastal village of Gemi has a height of between 0-100 m above sea level, then the temperature in the coastal Village of Gemi is: For a height of 0 m above sea level = $(26,3 - 0) °C = 26,3 °C$ To a height of 200 m above sea level = $26,3 - (0,61 \times (100/200))°C = 26,3 - (0,61 \times 2) °C = 26,3 - 0,61 °C = 25,08 °C$ So it can be seen that the average temperature of the coastal Village of Gemi ranged from 25,69 C to 26,3 C. Such temperature if it is used in the determination of land suitability class for cultivation of sorghum crop included in the suitability class S1 that is very appropriate

2 The availability of water

a) precipitation

Precipitation can affect the timing of planting and plant growth. Precipitation is relatively high in the coastal Village of Gemi which amounted to 1545 mm/year, then included in the suitability class S3, the class corresponding marginal for the cultivation of sorghum plants

b) Humidity

Humidity in a place of study can be calculated using the rainfall data of the area. Humidity can be seen from the type of

climate in a place. The type of climate in a certain place can be known by calculating the average of dry months divided by the average number of wet month and multiplied by 100% (Kartasapoetra, 2006). The Q values of the coastal Village of Gemi is 69. Based on the type of climate that is classified by the Schmidt and Fergusson, the Village Beach Gemi including D-type, namely the type with the value of Q ranges between 60-100%. The coastal village of Gemi with a humidity of 69, then it belongs to the class of suitability S1, that is very appropriate.

3 Rooting Media

a) the Texture of the Soil

Laboratory test results of Soil Faculty of Agriculture University of north Sumatra shows a soil sample of the Village Beach Gemi has a sand content of as much as 23,84 %, the content of dust 29.82 %, and the content of clay is 46.88 %. The results of the content of sand, silt and clay are inserted into the triangle class the texture of the soil, it will be obtained the texture of the clay is dusty. The texture of the soil in the coastal Village of Gemi has the texture of clay dust which is relatively smooth and is included in the suitability class S1 that is very appropriate.

b) Coarse Material

Coarse material is the percentage of gravel, kerakal, or rocks on each layer of soil. The content of coarse material in the coastal Village of Gemi on each layer of the soil is very low i.e. less than 15%. A layer of soil that exist in the coastal Village of Gemi tend to be very smooth and almost indistinguishable between the layers with another layer. Land Village Beach Gemi is the result of weathering of rocks are carried

away by the flood derived from the rocks of the bukit barisan, so that the soil that is produced having the texture of clay is dusty and likely to contain very little coarse material. Based on the content of the coarse materials of the soil, the coastal Village of Gemi have rough material less than 15% and included in the suitability class S1 that is very appropriate to plant sorghum.

b) effective soil Depth

The coastal village of Gemi has the thickness of the soil very deep. Measurements made in the coastal Village of Gemi, shows the depth of the effective soil reaches more than 60 cm so that it is included in the suitability class S1 is highly suitable for sorghum crop

4 Nutrient Retention

a) pH

The content of soil pH in the coastal Village of Gemi considered neutral that is as many as 5.45. The coastal village of Gemi have content soil pH (somewhat acidic) is not good for plant growth, so the soil in the coastal Village of Gemi included in the suitability class S2 is very suitable potential crop sorghum

c) C-organic

Laboratory test results for soil samples Village Beach Gemi containing C-organic very low, amounting to 0.79 %. The results of the test laboratory, shows that the land in the Village, the Beach Gemi has aggregated soil is not good so can not help maintain stability of the soil to avoid erosion. The coastal village of Gemi has soil C-organic low so that it is included in the class and conformity S3 that is appropriate marginal for growing crops sorghum

5 The danger of erosion

a) the Slopes

The coastal village of Gemi has a slope between 0-45%, but the area of dry land farming in the coastal Village of Gemi is a flat area that has a slope that is heavy. The content of C-organic soil coastal Village Gemi is high, so the land has a soil aggregate good that can be resistant to erosion. The results of the field observations show the land in the coastal Village of Gemi has a level of susceptibility

of erosion of the light, namely less than 0.15 and belongs to the class of suitability S1, that is very appropriate.

- 6 Flood hazard flood Hazard can be determined by calculating the duration of flooding and waterlogging. The coastal village of Gemi is an area that has the high annual rainfall amounting to 1874,87 mm/year. The results of the field observations and interviews of residents showed that the land in dry land agriculture in the coastal Village of Gemi never experience inundation or flooding, due to the impregnation of low water, the inundation or flood was caused because the Village Beach Gemi Is a great kumpulnya the water that comes from surrounding areas. The land has a level of flood hazard that can be ignored and included in the suitability class S1 that is very appropriate.

1.Land preparation

a) Rocks on the Surface

The results of the field observations that show the agricultural land in the coastal Village of Gemi containing surface rocks is low so that it is included in the suitability class S1 that is very appropriate to plant sorghum.

b) rock Outcrops

The rocks exposed in the coastal Village of Gemi is less than 5% and does not affect the productivity of agricultural land, so included in the suitability class S1 that is very appropriate to plant sorghum.

Based on the results of matching land quality and criteria requirements to grow the above plants, it can be concluded that the suitability of dry land in the coastal Village of Gemi for the cultivation of sorghum plant including suitability class marginal or suitability class S3 with the limiting factor permanent i.e. nutrient retention.

Which factor becomes the main limiting is the pH and C-Organic (which is low) that can be changed by providing

feedback or improvement conditions of the land with the giving of organic material, the provision of agricultural lime, materials and the soil and fertilizing.. limiting factors of land suitability for sorghum crop that can be improved is the drainage, base saturation, nutrient availability of N, P of soil and the pH.

The limiting factor base saturation can be carried out business improvements with the level of management, namely with the addition of organic matter or addition of fertilizers containing sulfur so that from the class of marginal suitable (S3) on the conformity of the actual land to be very suitable (S1) in terms of land suitability potential. Limiting factor N-total of soil can be corrected with the level of management, namely with fertilization according to crop needs. Needs N total crops upland rice to the criteria of the very tools necessary to 0.60% while the availability of total N contained in the soil when the study was 0.27% so that required the addition of 0.33% which is equivalent to 92 kg N/ha or 200 Kg Urea/ha. The Total fertilizer needed for rice crops in that area require the addition of an average of 25 % to meet the needs of microbes and the loss of nutrients N, so need the addition of fertilizer as much as 115 kg N/ha or 250 kg Urea/ha. With so suitability for total N to be very suitable (S1) of the class is appropriate (S2).

The limiting factor P₂O₅ soil can be corrected with the level of management is low, i.e. with fertilization according to crop needs. Need P₂O₅ crop upland rice according to the criteria of the very tools required 36 ppm while the availability of P₂O₅ contained in the soil when the research is 13,89 ppm so that the necessary addition of 12.11 ppm which is equivalent to 44.5 kg P₂O₅/ha is equivalent to 98,89 kg TSP/ha. The Total fertilizer needed for upland rice in areas that required additional average 25% to meet the needs of microbes and the loss of the phosphate so it needs the addition of fertilizer as much as 55.6 kg P₂O₅/ha or 123,61 kg TSP/ha. With so suitability for the phosphate to be highly suitable (S1) of the class is appropriate (S2).

CONCLUSION AND SUGGESTION

Conclusion

From the results it can be concluded that for sorghum plants can be developed in fields of

agricultural village beach gemi district stabat kabupaten langkat with attention to some aspects of (1) the availability of excessive water can be done making drainage and (2) retention of nutrients; pH that is slightly sour can be improved by the administration of lime sedangkan low organic C can be corrected by the provision of organic matter which can improve nutrient content increased in the soil

Suggestion

From the results of this study rice paddies in the coastal Village of Gemi Kecamatan Stabat Kabupaten Langkat can be cultivated plants of sorghum to enhance the growth and production needs to be done the addition of organic material and the material of an organic

REFERENCE

- Adie, M., dan A. Krisnawati. 2007. Balai Penelitian Tanah. 2004. Petunjuk Teknis Pengamatan Tanah. Balai Penelitian Tanah, Pusat Penelitian Tanah dan Agroklimat, Badan Penelitian dan Pengembangan Pertanian, Departemen Pertanian, 117 hal.
- CSR/FAO. 1983. Reconnaissance Land Resource Survey 1:250.000 scale. Atlas Format Procedures. Land Resources Evaluation with Emphasis on Outer Island Project. CSR/FAO Indonesia AGOFANS/78/006. Manual 4 version 1.
- Djaenudin, D., Marwan, H., H. Subagyo, A. Mulyani, dan N. Suharta. 2000. Kriteria Kesesuaian Lahan untuk Komoditas Pertanian. Versi 3.0. September 2000. Puslittanak, Badan Litbang Pertanian.
- Harahap, F.S. and Fitra, Y.R., 2020. Characteristics of Chemical Properties of Oil Palm Soil at Plant Age in Different Areas of Land. *Jurnal Pertanian Tropik*, 7(2, Agustus), pp.233-238.

- Harahap, F.S., 2018. evaluasi status kesuburan npk tanah sawah tadah hujan di Kecamatan Beringin Kabupaten Deli Serdang. *JURNAL AGROPLASMA*, 5(1), pp.30-34.
- Harahap, F.S., Harahap, D.E. and Harahap, P., 2020. Land Characteristics And Land Evaluation For Development On Other Use Area Rice Fertilizer Plants In District Salak Regency Pakpak Bharat. *ZIRAA'AH MAJALAH ILMIAH PERTANIAN*, 45(2), pp.195-204.
- Harahap, F.S., Rauf, A., Rahmawaty, R. and Sidabukke, S.H., 2018. Evaluasi kesesuaian lahan pada areal penggunaan lain di Kecamatan Sitellu Tali Urang Julu Kabupaten Pakpak Bharat untuk pengembangan tanaman cabai merah (*Capsicum annum L.*). *Jurnal Tanah dan Sumberdaya Lahan*, 5(2), pp.829-839.
- Harahap, F.S., Rauf, A., Rahmawaty, R. and Sidabukke, S.H., 2018. Evaluasi kesesuaian lahan pada areal penggunaan lain di Kecamatan Sitellu Tali Urang Julu Kabupaten Pakpak Bharat untuk pengembangan tanaman cabai merah (*Capsicum annum L.*). *Jurnal Tanah dan Sumberdaya Lahan*, 5(2), pp.829-839.
- Harahap, F.S., Sitompul, R., Rauf, A., Harahap, D.E. and Walida, H., 2019, May. Land suitability evaluation for oil palm plantations (*Elaeisguenensis jacq*) on Sitellu Tali Urang Julu, Pakpak Bharat District. In *IOP Conference Series: Earth and Environmental Science* (Vol. 260, No. 1, p. 012116). IOP Publishing.
- Harahap, F.S., Walida, H., Rauf, A., Arman, I. and Wicaksono, M., 2020. Evaluasi kesesuaian lahan tanaman pisang (*musa acuminata colla.*) di Kecamatan Salak Kabupaten Pakpak Bharat. *Jurnal Agroekoteknologi dan Agribisnis*, 3(1).
- Hartono, B., Rauf, A., Elfiati, D., Harahap, F.S. and Sidabuke, S.H., 2018. Evaluasi kesesuaian lahan pertanian pada areal penggunaan lain untuk tanaman kopi arabika (*Coffea arabica L.*) di Kecamatan Salak Kabupaten Pak-Pak Bharat. *Jurnal Solum*, 15(2), pp.66-74.
- Purbayanti, E.D., E.D., D.R. Lukiawati dan R. Trimulatsih. 1988. Dasar-Dasar Ilmu Tanah. Gajah Mada University Press, Yogyakarta.
- Pusat Data dan Informasi Pertanian ,2018.Publikasi. Setjen.pertanian.go.id
- Puslittanak, 2005. Teknologi Pengelolaan Lahan kering : Menuju pertanian produktif dan ramah lingkungan. Pusat Penelitian Tanah dan Agroklimat. Bogor.
- Rafidi, S., 1982 Dasar dasar ilmu tanah. Institut Pertanian Bogor
- Rahmawaty, R., Frastika, S., Rauf, A., Batubara, R. And Harahap, F.S., 2020. Land suitability assessment for *Lansium domesticum* cultivation on agroforestry land using matching method and geographic information system. *Biodiversitas Journal of Biological Diversity*, 21(8).
- Rosmarkam dan Yowono, 2002. Ilmu kesuburan tanah. Yogyakarta
- Sirappa, M.P, 2003. Prospek pengembangan sorgum di Indonesia sebagai komoditas alternative untuk pangan, pakan dan industry. *Jurnal Litbang Pertanian* 22:133-140
- Sukmawati, 2015. Analisis ketersediaan C-organik di lahan kering setelah diterapkan berbagai model system pertanian Hedgerow., *Jurnal Galung Tropika*, 4 (2) Agustus 2015. hlm 115-120
- Thamrin M, Abdul Rauf, Benny Hidayat , 2015 Dampak Penanaman Pohon Hutan di Lahan Perkebunan Karet (*Hevea brasiliensis Muell. Arg*) Pada Sifat Biologi Tanah di Kecamatan Bahorok Kabupaten Langkat , *Jurnal Agroekoteknologi FP USU*. E-ISSN No. 2337 6597 Vol.5.No.2, April 2017 (46): 362-372
- Walida, H., Harahap, F.S., Ritongah, Z., Yani, P. and Yana, R.F., 2020. Evaluasi Status Hara Bahan Organik Terhadap Sifat Kimia Tanah Di Lahan Miring Kelapa Sawit. *ZIRAA'AH MAJALAH*

ILMIAH PERTANIAN, 45(3), pp.234-240.