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Identification distribution grow genotype sorghum North Sumatra Local

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ABSTRACT

Sorghum plants has long been cultivated in Indonesia, including in Sumatera Utara was found nine types of sorghum genotypes that grow and were cultivated in five districts in a way down hereditary, productivity plants that were still low because of planted in a way monoculture, intercropping and overlapping insert no intensive. Sorghum plants be the Solution for replacement plant food others. Research objectives for evaluate conformity grow plant genotype sorghum based on condition grow plant namely height place and temperature at the location cultivation sorghum local Sumatera Utara. The analysis method used matching method (matching) height data place and temperature based on condition grow plant sorghum. The analysis results had location regency Langkat, Deli Serdang and Serdang Bedagai were very suitable for cultivation plant sorghum and seen from weight 100 seeds highest found in the Deli Serdang location 330 g of planting, more heavy the seeds from area other especially Karo location had weight 100 seeds lowest matter This caused by altitude places and temperatures had no in accordance for cultivation plant of sorghum.

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1. INTRODUCTION

Sorghum plant (Sorghum bicolor) has a very important role in context agriculture, food, and various sector including food humans and food livestock (A'ayuni et al., 2021), potential development variety superior and agriculture sustainable (Kaaria et al., 2021). Sorghum is plants that have diversity significant genetic (Ardiyanti et al., 2019). Identification distribution sorghum help in guard diversity genetics this, which can used in glorification For develop more varieties stand to disease and more productive (Aqil, 2021).

Identification distribution genotype sorghum local is a process for recognize and understand pattern distribution genotype sorghum in a area or location certain (Risnawati et al., 2021), Identification distribution sorghum can also help in identify areas where sorghum grow with Good although pressure change climate (Cosentino et al., 2012). This can help in identify variety resistant sorghum to condition increasingly climate extreme (Borrell et al., 2014). Farmers and entrepreneurs agriculture can use information about distribution sorghum for plan use land and resources more power efficient (Subagio & Aqil, 2014), management water giving, Giving fertilizers,

and pesticides (Saini et al., 2023). Identification This is component important in studies distribution area mapping genotype sorghum local (Risnawati et al., 2021).

Identification distribution plant sorghum can give valuable insights For farmers and pickers policy agriculture For understand where sorghum is planted (Risnawati et al., 2021), in amount what, and how condition its growth . This can help in planning scheduling planting, management source power, and ensure availability sorghum as source food that is resistant drought (Suarni, 2016).

Result of identification in the form of map conformity plant is a very valuable tool in support development plants that will cultivated in a regions (Ratnasari et al., 2019). Determination Usage variety or cultivar the most suitable plants for the area. suitable varieties can produce more results good and durable to condition local (Puspitasari et al., 2012).

Mapping plant help in management and use efficient land (Risnawati et al., 2021)). This can help avoid excessive cultivation and use land that is not sustainable and also possible for farmer for plan timetable proper planting. This can minimize risk like the weather is not stable or attack pests (Ratnasari et al., 2019).

With know location plants that will grow best, will can give information in planning development agriculture term long including rotation plants , selection plant closing land and diversification cultivation (Nedumaran et al., 2013). Success rate in do mapping cultivated plants can influenced by a number of factors (KM, 2017). Mapping effective and accurate plants is step important in manage cultivation plant with good (Risnawati et al., 2021). main purpose from identification distribution grow genotype sorghum local is For get understanding about genotype existing sorghum in the region, pattern distribution and factors environment like height place and temperature that affect distribution plant.

2. METHOD

2.1 Time and Place

Study This conducted in the North Sumatra region in August 2021 until by November 2021.

2.2 Materials and tools

Materials used label paper as whereas tools used drill soil, sample ring, Global Positioning System (GPS). Abney level, pH stick, edge dagger, bottle spray, altimeter, compass, loupe, hammer geology, penetrometer, hydrogen peroxide, HCl and books guidelines observation land

2.3 Research methods.

Data obtained will matching of criteria data is carried out conformity grow plant sorghum with elevation data place and temperature at the location grow genotype sorghum local in North Sumatra.

2.4 Research implementation

Stages activity as following:

2.4.1 Collection of information data

Data collection is collected through interview to government or the Department of Agriculture North Sumatra Province, Students Faculty North Sumatra Agriculture and Groups farmers in North Sumatra.

2.4.2 Identification

Data about genotype sorghum local collected through survey field, the plants obtained given sign coordinates with using GPS on location the.

2.4.3 Mapping

Data collected used for make map distribution genotype sorghum local. Map shaped map thematic that shows distribution genotype sorghum local in North Sumatra. Mapping program thematic This using Arcview GIS 3.2 software with comparison map used 1 : 20,000

2.4.4 Environmental Factor Analysis

Distribution plant often influenced by various factor among others, climate is one of them is temperature and altitude place. Analysis This important for understand pattern distribution plant genotype sorghum local with use Braak's theory (Herdani et al., 2015).

2.4.5 Criteria data Land suitability for plant Sorghum

On evaluation conformity land for plant sorghum data criteria suitable land with need plant sorghum is very important. This process involving Matching or mapping characteristics land with requirements plants that will cultivated ((Djaenudin et al., 2011). Criteria data relevant land for evaluation conformity land for cultivation plant sorghum presented in Table 1. below this:

Table 1. Criteria Land Suitability For plant sorghum

Characteristics land	Class Land Suitability			
	S1	S2	S3	N
Temperature (tc)				
Temperature average (^{0}C)	25-27	27-30	30-35	> 35
		18-25	15-18	< 15
Height Place asl (m)	< 200	200-1200	1200-2000	>2000
availability (wa)				
Rainfall (mm)	400-900	300-400	130-500	< 150
		900-1200	1200-1400	> 1400
dry period (months)	4-8	8-8.5	8.5-9.5	> 9.5
		2.5-4	1.5-2.5	< 1.5
Humidity	< 75	75-85	>85	
Availability oxygen (oa)	Well, kinda.	Somewhat fast,	hampered	Very hampered,
Drainage	hampered	moderate		fast

Source : (Djaenudin et al., 2011)

3. RESULTS AND DISCUSSION

3.1 Compliance land circulating height place

From the survey results, 9 locations were found planting spreading sorghum as many as five districts in North Sumatra. Location data, coordinates, altitude the location of each region in North Sumatra is presented in Table 2. Below:

Table 2. Land Suitability Genotype Sorghum Local North Sumatra Based Height Place

No	Location	Village	Coordinates	Altitude (m above sea level)	Class Compliance
1	Tanah Matahari Terbit	Karang Gading	3° 52' 28" N 98° 34' 31" E	5	S1
2	Tanah Matahari Terbit	Sepotong kue	3° 50' 27" N 98° 32' 10" E	5	S1
3	Tanah Matahari Terbit	Tabrakan	3° 43' 10" N 98° 23' 45" E	8	S1
4	Karo	Tiga Air Mancur	3° 7' 4.53" N 98° 25' 1.2" E	1051	S2
5	Karo	Ajimbeling	3° 7' 32.15" N 98° 32' 14" E	1221	S3
6	Serdang Bedagai	Pengajaran	3° 28' 50.98" N 98° 58' 24" E	17	S1
7	Serdang Bedagai	Blokade	3° 27' 18.93" N 99° 9' 0.22" E	19	S1
8	Delhi Raya	Penempatan Banyan	3° 36' 6" N 98° 54' 6.01" E	15	S1
9	Delhi Raya	Desa Tumpatan Nibung	3° 36' 9" N 98° 49' 0.1" E	10	S1

From Table 2 it shows for very suitable area location for development plant sorghum based on temperature located in the district The steps in the villages of Karang Gading, Selotong and Pertumbukan , Serdang Bedagai district in the village Pengajarahan and Pengalangan and Deli Serdang district in the village Banyan Emplacement and village The spill Nibung whereas Karo district in Tiga Pancur village enter class Enough according to the village Ajimbeling enter class No in accordance For development plant sorghum .

In cultivation plant condition grow temperature and humidity have a big influence in success cultivation plants, which have an effect to tall low a place (Herdani et al., 2015). Braak's theory states that that every height a place up 100 m then temperature will down 0.61 ^{0} C, p This can measured with use *thermometer* and *hygrometer*. The results of the data matching analysis are presented in Figure 1.

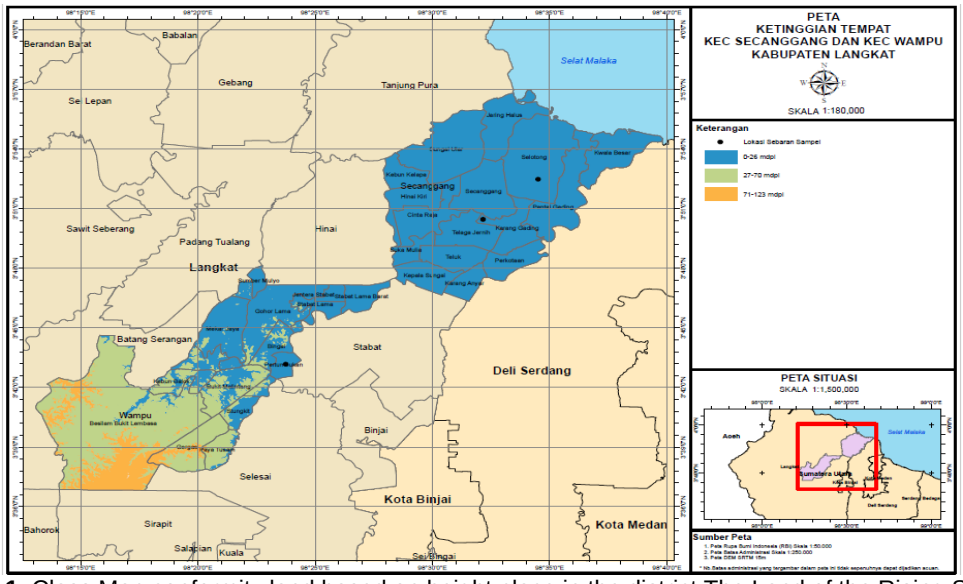

Figure 1. Class Map conformity land based on height place in the district The Land of the Rising Sun For development plant sorghum

Figure 1 shows that shaded area colored blue is area where found genotype sorghum local, for height place in the area the enter into the Very suitable class for cultivation plant sorghum. At an altitude of 250 meters above sea level mdpl plant sorghum can grow on the contrary, plants This age the harvest longer when planted more from 500 m above surface sea (Nurharini et al., 2016).

The results of the data matching analysis are presented in Figure 2. Class Map conformity land based on height place in Karo district for development plant sorghum.

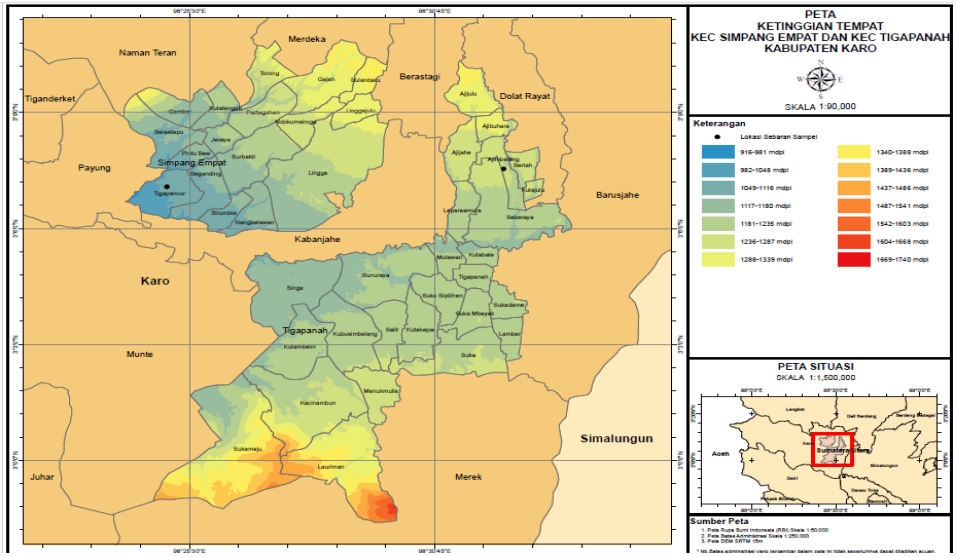

Figure 2. Class conformity land based on height place in Karo district for development plant sorghum

Figure 2 shows that shaded area colored blue is Area Where it was found genotype sorghum local, for height place in the area the enter into the class Enough in accordance for cultivation plant sorghum, while color red enter into the class No in accordance for plant sorghum. Sorghum planted in areas with an altitude of >500 m above sea level surface sea plant sorghum will low height and size leaf small and more short (Nurharini et al., 2016). While at a height of place ± 350 m above sea level and type Latosol soil with treatment distance plant to growth and yield various cultivar sorghum (sorghum bicolor (L.) Moench), cultivar sorghum increase tall plants, stem diameter, number leaves, weight seed dry per plant, weight seeds per plot and weight 1000 seeds.

The results of the data matching analysis are presented in Figure 3. Class Map conformity land based on height places in Serdang Bedagai district for development plant sorghum

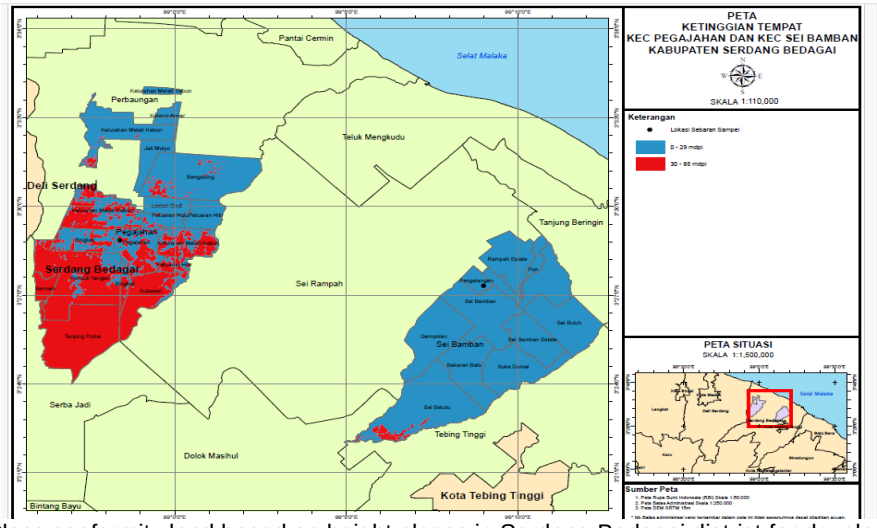

Figure 3. Class conformity land based on height places in Serdang Bedagai district for development plant sorghum

Figure 3 shows that shaded area colored blue and red is area where found genotype sorghum local, for height place in the area the enter into the very suitable class for cultivation plant sorghum. At an altitude of 25 m above sea level plant sorghum increase growth sorghum with treatment mulch (Hartati, 2021).

The results of the data matching analysis are presented in Figure 4. Class Map conformity land based on height place in Deli Serdang district for development plant sorghum.

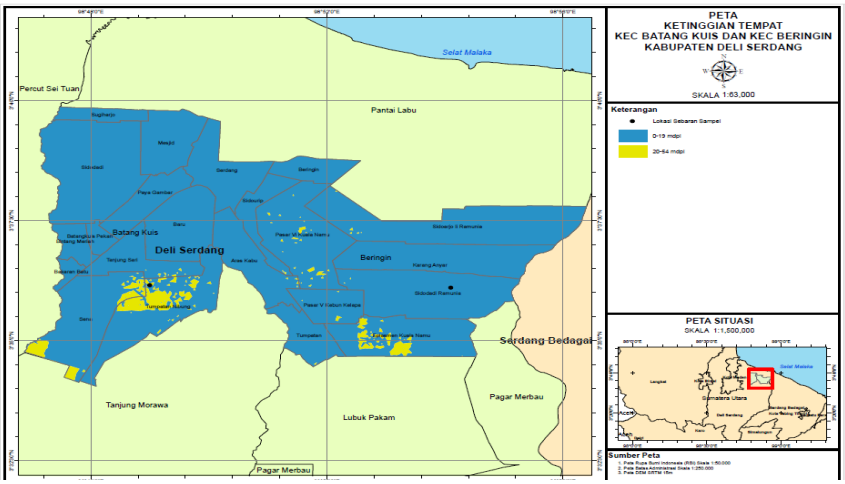

Figure 4. Class conformity land based on height place in Deli Serdang district for development plant sorghum

Figure 4 shows that shaded area colored blue is area where found genotype sorghum local, for height place in the area the enter into the very suitable class for cultivation plant sorghum. Sorghum Plant can grow in the range height spacious place. However thus optimum height for growth sorghum range from 0-500 above sea level, at altitudes above 500 above sea level usually hinder growth and delay in flowering (Fiqriansyah et al., 2021).

3.2 Land Suitability based on temperature

From the survey results, 9 locations were found planting spreading sorghum as many as five districts in North Sumatra. Location data, coordinates, and temperature of each region in North Sumatra are presented in Table 3. Here:

Table 3. Land Suitability Genotype Sorghum Local North Sumatra Based Temperature

No	Location	Village	Coordinates	Temperature (^{0}C)	Class Compliance
1	Tanah Matahari Terbit	Karang Gading	3° 52' 28" N 98° 34' 31" E	28	S2
2	Tanah Matahari	Sepotong kue	3° 50' 27" N	27	S1

3	Terbit Tanah	Matahari	Tabrakan	98° 32' 10" E 3° 43' 10" N	26	S1
4	Terbit Karo		Tiga Air Mancur	98° 23' 45" E 3° 7' 4.53" N	22	S2
5	Karo		Ajimbeling	98° 25' 1.2" E 3° 7' 32.15'' N	21	S3
6	Serdang Bedagai		Pengajaran	98° 32' 14" E 3° 28' 50.98" N	26	S1
7	Serdang Bedagai		Blokade	98° 58' 24" E 3° 27' 18.93" N	26	S1
8	Delhi Raya		Penempatan Banyan	99° 9' 0.22" E 3° 36' 6" N	25	S1
9	Delhi Raya		Desa Tumpatan Nibung	98° 54' 6.01" E 3° 36' 9" N 98° 49' 0.1" E	25	S1

Description: Identification Survey Data genotype Sorghum local 2021. S1 (Very suitable), S2 (Sufficient) appropriate), S3 (Marginal Appropriate).

From Table 3 it can be seen that seen that for location of suitability area very suitable land for development plant sorghum based on temperature located in the district steps in the village Selotong, Collision while in Karang Gading village it is included classy Enough according to, Serdang Bedagai district in the village Pengajarahan and Pengalangan and Deli Serdang district in the village Banyan Penempatan and village Tumpatan Nibung whereas Karo district in the village Crossroads Four according to marginal and village Ajimbeling enter class Enough in accordance for development plant sorghum .

The results of the data matching analysis are presented in Figure 5. Class Map conformity land based on temperature in the district The Land of the Rising Sun For development plant sorghum.

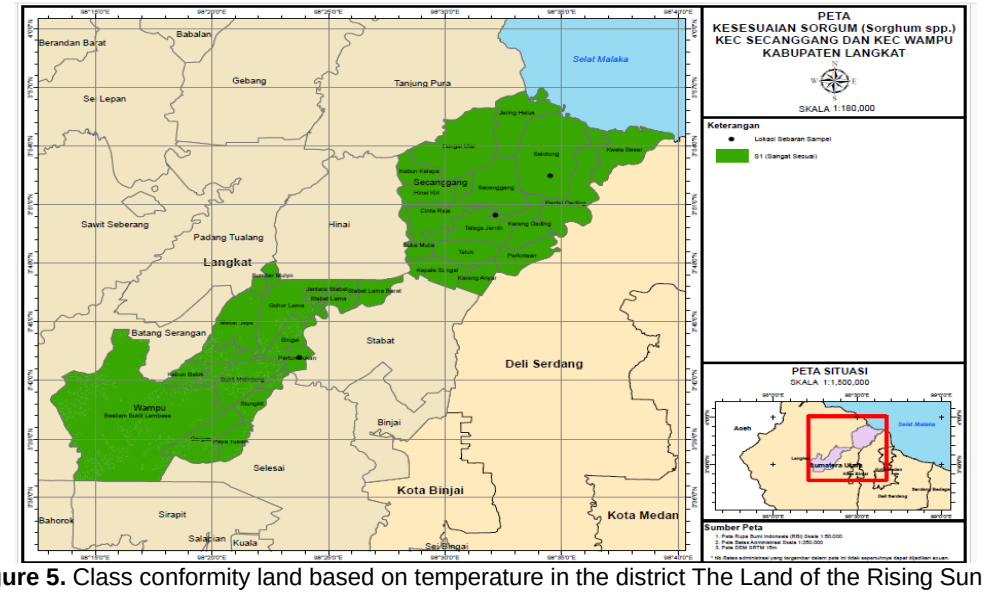

Figure 5. Class conformity land based on temperature in the district The Land of the Rising Sun For development plant sorghum.

Figure 5 shows that shaded area colored green is area where found genotype sorghum local, for temperature in the area the enter into the very suitable class for cultivation plant sorghum. The more tall temperature so Power sprouts the more low. Suitable growing location for growth and sweet sorghum at a temperature of 28 ^{0} C showed results good germination (Srinivasa Rao et al., 2014) .

The results of the data matching analysis are presented in Figure 6. Class Map conformity land based on temperature in Karo district for development plant sorghum

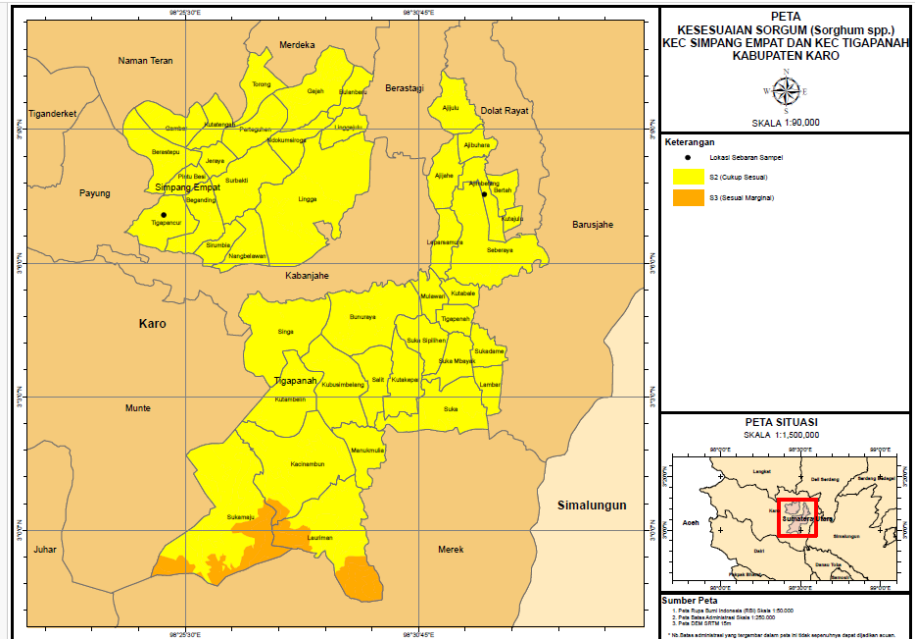

Figure 6. Class conformity land based on temperature in Karo district for development plant Sorghum

Figure 6 shows that shaded area colored yellow and orange are area where found genotype sorghum local, for temperature in the area the enter into the class Enough according to the area ajimbeling and marginally appropriate for cultivation plant sorghum. The optimum temperature is favorable conditions in germination Seeds. Minimum temperature limit for plants This life is at a temperature of 8.3 °C. The more low temperature so possibility failure For germinate the more big, besides That happen damage to seeds (A'ayuni et al., 2021).

The results of the data matching analysis are presented in Figure 7. Class Map conformity land based on temperature in Serdang Bedagai district for development plant sorghum.

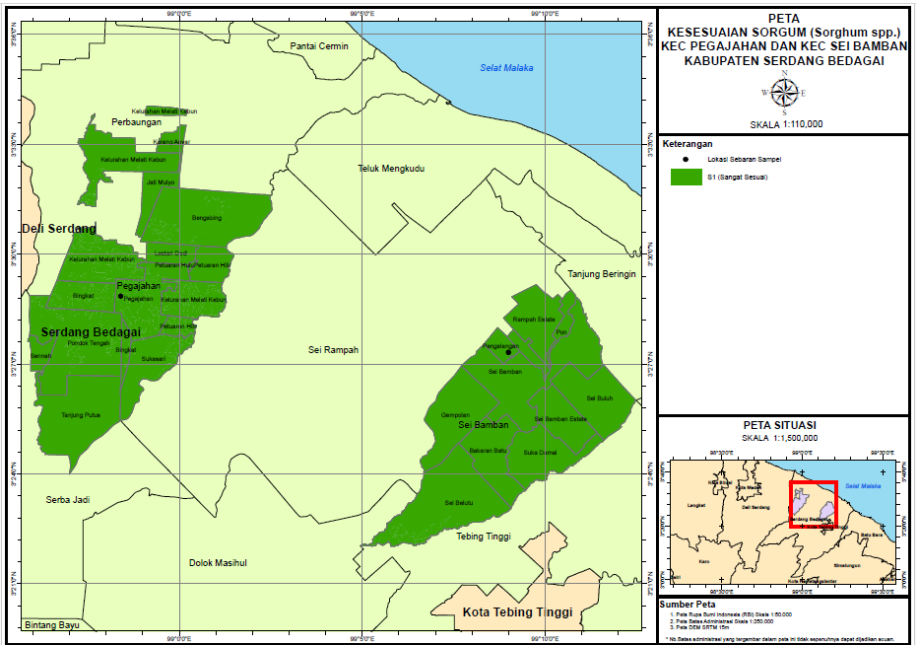

Figure 7. Class conformity land based on temperature in Serdang Bedagai district For development plant Sorghum

Figure 7 shows that shaded area colored green is area where found genotype sorghum local, for temperature in the area the enter into the very suitable class for cultivation plant sorghum. Influence condition temperature as factor important in the metabolic process, temperature provides percentage the highest germination in period short time. At a temperature below 25 ^{0}C which is low

and temperature above 30 ° C so sorghum shoot growth the more slow (Srinivasa Rao et al., 2014).

The results of the data matching analysis are presented in Figure 8. Class Map conformity land based on temperature in Deli Serdang district for development plant sorghum.

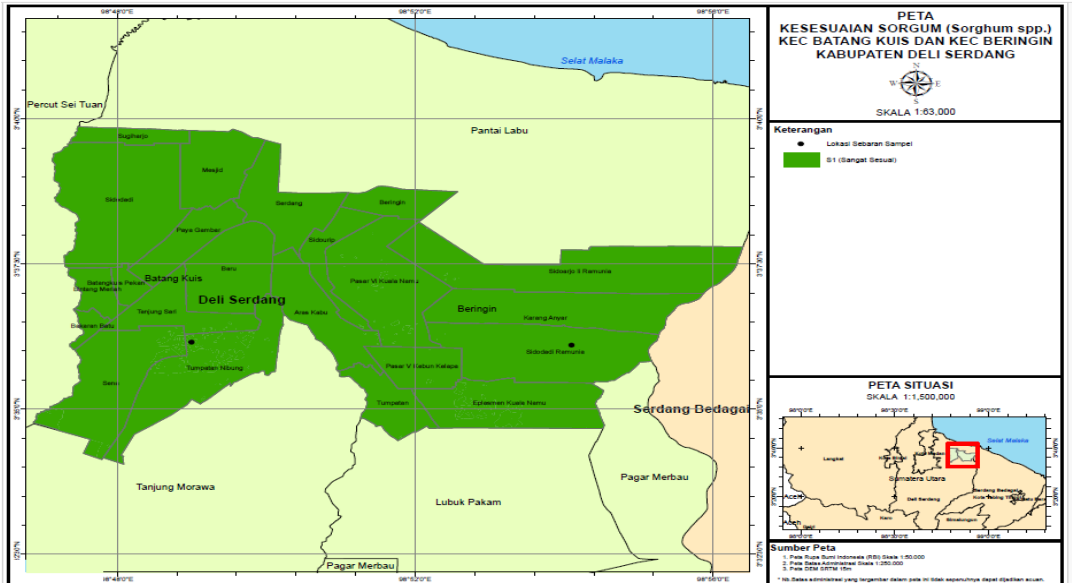

Figure 8. Class conformity land based on temperature in Deli Serdang district for development plant Sorghum

Figure 8 shows that shaded area colored green is area where found genotype sorghum local, for temperature in the area the enter into the very suitable class for cultivation plant sorghum. Sorghum plant need optimum temperature ranges from 23-30 ^{O} C if under temperature 23 ^{0} C then plant sorghum will own Long lifespan (Srinivasa Rao et al., 2014). Appropriate temperature for germination sweet sorghum 25 ^{0} C some variety capable produce sufficient sprout length good. While at a temperature of 28 ^{o} C the highest sprout length was in the Sweet variety.

Table 4. Average weight of 100 seeds (g) at the location grow Sorghum local North Sumatra

No	Location	Village	Coordinates	Temperature (^{0}C)	Altitude (asl)	Weight of 100 Seeds (g)
1	Tanah Matahari Terbit	Karang Gading	3° 52' 28" N 98° 34' 31" E	28	5	3.02
2	Tanah Matahari Terbit	Sepotong kue	3° 50' 27" N 98° 32' 10" E	27	5	3.10
3	Tanah Matahari Terbit	Tabrakan	3° 43' 10" N 98° 23' 45" E	26	8	3.15
4	Karo	Tiga Air Mancur	3° 7' 4.53" N 98° 25' 1.2" E	22	1051	2.60
5	Karo	Ajimbeling	3° 7' 32.15" N 98° 32' 14" E	21	1221	2.45
6	Serdang Bedagai	Pengajaran	3° 28' 50.98" N 98° 58' 24" E	26	17	3.18
7	Serdang Bedagai	Blokade	3° 27' 18.93" N 99° 9' 0.22" E	26	19	3.00
8	Delhi Raya	Penempatan Banyan	3° 36' 6" N 98° 54' 6.01" E	25	15	3.30
9	Delhi Raya	Desa Tumpatan Nibung	3° 36' 9" N 98° 49' 0.1" E	25	10	3.10

Description: Identification Survey Data genotype Sorghum local 2021

From Table 4 it can be seen that seen that for the location of the area that has been done temperature and altitude data analysis place get an average weight of 100 seeds that vary, weight seed highest there is in the area village Banyan with value 3.30 g and lowest located in the area Ajimbeling 2.45 g. Temperature and altitude place influence weight 100 seeds Where more temperature air low so height place will tall .

Identification distribution grow genotype sorghum local North Sumatra provides directions that for development plant sorghum based on height place and temperature location in district Langkat, Serdang Bedagai and Deli Serdang are very suitable location for development plant cultivation sorghum in the future come.

4. CONCLUSION

Location of suitability area very suitable land (S1) for development plant sorghum based on height place located in the district Langkat in the villages of Karang Gading, Selotong and Pertumbukan, Serdang Bedagai district in the village Pengajarahan and Pengalangan and Deli Serdang district in the village Banyan Emplacement and village The spill Nibung whereas Karo district in the village Crossroads Four and the village Ajimbeling enter class No in accordance for development plant sorghum. Location of suitability area very suitable land For development plant sorghum based on temperature located in the district steps in the village Selotong , Collision while in Karang Gading village it is included classy Enough according to (S2) Serdang Bedagai district in the village Pengajarahan and Pengalangan and Deli Serdang district in the village Banyan Emplacement and village The spill Nibung whereas Karo district in the village Crossroads Four and the village Ajimbeling enter class No in accordance For development plant sorghum.

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