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Characteristics Of Land For Development And Establishment Of The Village Of Wheat (*Triticum aestivum* L.) In West Sumatra, Indonesia

Juniarti¹⁾, Darfis. I¹⁾, Yasin. S¹⁾, Ningsih. P¹⁾, Suliansyah. I¹⁾

¹⁾Team of Wheat Researcher, Andalas of University, Padang,
West Sumatera, Indonesia

*Corresponding author: Juniarti, TEL: +6281266574253,
Email: yuni_soil@yahoo.co.id

ABSTRACT

Cultivation of wheat was in the formation of village farmland Alahan Panjang, Batu Bagirik district, Lembah Gumanti, Solok Regency, West Sumatra. The agricultural land was intensively used by farmers. Intensified land use led to a decline in the quality of agricultural land. Productivity of land for development of wheat is influenced by the quality/soil characteristics, including soil, climate and land management. So we need the business management of land resources and environment to increase land productivity through the establishment of appropriate land characteristics for wheat development and land management through the addition of organic matter such as composted cow manure and inorganic fertilizers, to increase the yield of wheat crop. This study was aimed to determine the characteristics of the land suitable for wheat crop and land management right. The study was conducted in Alahan Panjang, Batu Bagirik, District, Lembah Gumanti, Solok Regency from September 2012-September 2013. Composite soil sampling conducted at a depth of 0-20 cm. The results showed that agricultural land in Alahan Panjang, Batu Bagirik district. Lembah Gumanti, Solok had potential for the development of the wheat crop, the characteristic formation of village land; temperatures average 21-28° C, 600-1200 mm rainfall, humidity was 24-75 %, good drainage, soil depth > 75 cm, pH 5.5 to 6.2, as well as the availability of N, P and K were high, with the result of the weight of 1000 seeds/g from 47.90 to 49.88.

Key words: wheat (*Triticum aestivum* L.), soil characteristics, land management

INTRODUCTION

Agricultural land in Alahan Panjang Batu Bagirik district. Solok, regency at the Lembah Gumanti village for formation of wheat and wheat cultivation was intensively agricultural land used by farmers. Intensified land use led to a decline in the quality of agricultural land and agricultural production is characterized by increasingly low soil organic C content in the <2%¹. The addition of organic matter from the outside is very necessary to look for in order to produce optimum crop needs.

Productivity of land for development of wheat was influenced by the quality/soil characteristics, including soil, climate and land management. So we need the business management of land resources and environment to increase land productivity through the establishment of appropriate land characteristics for wheat development and land management through the addition of organic matter such as compost from cow manure and inorganic fertilizers to increase crop yields of wheat, as well as improve the quality of land for wheat cultivation in a sustainable manner.

Wheat (*Triticum aestivum* L.) is the staple food in Indonesia after rice. Wheat is an important cereal crops enough for food. Wheat-based food consumption continues to rise, which today has reached 16 kg/capita /year. The needs of the national wheat almost entirely met by imports, so that Indonesia is now the fifth largest wheat importer to import a total of 4.5 million t/year and this figure continues to rise at a rate of 2.6%/year. In 2020 wheat imports are expected to reach 8.5 million t/year of course requires no small amount of foreign exchange². It is necessary for the development efforts of wheat cultivation in Indonesia. Indonesia has the potential to develop wheat land area of 73 455 ha in 15 provinces, the largest in the province of Bengkulu area of 30,800 ha and the smallest in area of 125 ha of West Sumatra. So the opportunity to develop an open enough.³

Wheat has good potential to be developed in Indonesia because they have a fairly wide environmental adaptation. In order to achieve the successful development of the wheat and the type of tillage and proper planting time, seed quality and selection of sites such as altitude, temperature is an important factor to consider. Requirements of land use / land suitability classes for wheat crop can be seen in Table 1.⁴

Table 1. Requirements of land use/land suitability classes for the wheat crop.

Requirements of land use/Land Characteristics	Classification of Land Suitability			
	S1	S2	S3	N
Temperature (t)				
-Temperatures average (°C)	21-28	20 – 22 / 28-30	15-20 / 30-34	<15 / >34
Water availability (w)				
-Rainfall (mm)	600-1200	1200-1400 / 500-600	>1400 / 400-500	< 400
Air humidity (%)	24-75	20 – 24 / 75-90	< 20 / > 90	
Oxygen availability (o)				
-Drainage	b, ab	s	t, at	st
Rooting medium (r)				
-Texture	ak, s	ah	h	k

-Coarse material (%)	< 15	15-35	35-55	> 55
-Depth of soil (cm)	> 75	50-75	25-75	< 25
Nutrient retention (n)				
-CEC clay (cmol)	> 16	≤16	-	-
-Base saturation (%)	> 35	20-35	< 20	
-pH H ₂ O	5.5 – 6.2	5.2-5.5 / 6. 2-6.8	< 5.2 / > 6.8	
-N-Total	t-st	r-s	sr	td
-K ₂ O	st, t, s	r-sr	td	td
-P ₂ O ₅	st	t-s	r	sr
-C-organic	> 1.2	0.8 – 1.2	< 0.8	
Toxicity (xc)				
-Salinity (dS/m)	< 2	2-4	4-6	> 6
Sodositas (xn)				
-Alkalinity/ESP	< 10	10-15	15-20	> 20
Erosion hazard (e)				
-Slope (%)	< 8	8-16	16-30	>30
-Erosion hazard	sr	r-s	b	sb
Flood hazard (f)				
-Flood	FO	-	-	> F1
Land preparation (lp)				
-Rocks at the surface (%)	< 5	5-15	15-40	>40
-Rock outcrop (%)	< 5	5-15	15-25	>25

st = very high, t = high, s = medium, r = low, sr = very low, td = no data, k = rough, ak = little rough, ah = little smooth, h = smooth. Siswanto (2006).

This study was aimed to determine the characteristics of the land suitable for wheat crop and land management right.

MATERIALS AND METHOD

The study was conducted in Alahan Panjang, Batu Bagirik district, Lembah Gumanti, Solok regency from September 2012-September 2013.

The study was conducted on land that has been planted wheat organic fertilizers such as compost cow manure and inorganic fertilizer, with both minimum tillage techniques. Composite soil sampling conducted at a depth of 0-20 cm.

RESULTS AND DISCUSSION

Agricultural land in Alahan Panjang was generally located at an altitude of 1,600 m above sea level and temperature of ± 20°C was used for agriculture horticulture and tea plantations. This land also has the potential for development of wheat, because wheat crops can grow well at altitudes above 800 m above sea level with optimum temperature 20-25 °C with rainfall around 600-825 mm / year and has an average humidity of about 80-90% and intensity of irradiation 9-12 hours/day. Grain development in Indonesia was concentrated in the subtropical highland also limited extent.⁵

The results of analysis of soil samples in the area planted with wheat in Alahan Panjang displayed in Table 2. Based on observations of land characteristic shown in Table 2.

Table 2. Chemical characteristics of the soil on the land planted with wheat types of different land management.

Type of land management	Characteristics of soil chemistry								
	pH	CEC (me/100g)	C organic (%)	N tot (%)	K-dd (me/100g)	P available (ppm)	Ca-dd (me/100g)	Mg-dd (me/100g)	Al-dd (me/100g)
Minimum without the addition of organic matter	5.76	96.01	9.41	0.39	1.57	36.33	0.82	0.59	0.47
Minimum with the addition of inorganic fertilizers	5.66	111.74	8.35	0.36	1.59	40.49	0.85	0.61	0.48
Minimum with the addition, compost of cow manure	5.78	113.04	9.05	0.47	1.61	41.62	0.87	0.62	0.67

Analysis of soil samples showed that agricultural land in Alahan Panjang, Batu Bagirik district, Lembah Gumanti, Solok regency potential for the development of wheat plants with soil characteristics average temperature 21-28 °C, 600-1200 mm rainfall, humidity 24-75%; good drainage, soil depth > 75 cm, pH 5.5-6.2 as well as the availability of N, P and K were high (Table 3.).

Table 3. shows that the characteristics of the agricultural land in the Alahan Panjang was potential for the development of the wheat plant.

Table 3. Characteristics of land with potential for development of wheat in Alahan Panjang on any type of land management

Land characteristics	Type of land management		
	Minimum without the addition of organic matter	Minimum with the addition of inorganic fertilizers	Minimum with the addition, compost of cow manure
Temperature(t)			
-Temperature average (°C)	21-28	21-28	21-28
Water availability (w)			
-Rainfall (mm)	600-1200	600-1200	600-1200
Air humidity (%)	24-75	24-75	24-75
Oxygen availability (o)			
-Drainage	b, ab	b, ab	b, ab
Rooting medium (r)			
-Texture	ak, s	ak, s	ak, s
-Coarse material (%)	< 15	<15	<15
-Depth of soil (cm)	> 75	> 75	>75
Nutrient retention (n)			
-CEC clay (cmol)	> 16	> 16	>16
-Base saturation (%)	> 35	> 35	> 35
-pH H ₂ O	5,5-6,2	5,5 – 6,2	5,5 – 6,2
-N-Total	t-st	t-st	t-st
-K ₂ O	st, t, s	st, t, s	st, t, s
-P ₂ O ₅	st	st	st
-C-organic	> 1,2	> 1,2	> 1,2
Toxicity (xc)			
-Salinity (dS/m)	< 2	< 2	< 2
Sodositas (xn)			
-Alkalinity /ESP	< 10	< 10	< 10
Erosion hazard (e)			
-Slope (%).	< 8	< 8	< 8
-Erosion hazard	sr	sr	sr
Flood hazard (f)			

-Flood	FO	FO	FO
Land preparation (lp)			
-Rocks at the surface (%)	< 5	< 5	< 5
-Rock outcrop (%)	< 5	< 5	< 5

st = very high, t = high, s = medium, r = low, sr = very low, td = no data, k = rough, ak = little rough, ah = little smooth, h = smooth.

By applying minimum tillage techniques because the land was dominated by young soils that have not been further development, which is included in order Inceptisol. Although the type of land management without the addition of organic matter has the potential for development of wheat with the results of the weight of 1000 seeds/g from 47.90 to 49.88, but if pursued continuously without the addition of organic matter can reduce the quality of the land. The additional input in the form of organic fertilizer was needed for that.

CONCLUSION

The results showed that agricultural land in Alahan Panjang, Batu Bagirik district, Lembah Gumanti, Solok was potential for the development of wheat plants with soil characteristics average temperature 21-28 ° C, 600-1200 mm rainfall, humidity 24-75%, good drainage, soil depth > 75 cm, pH 5,5-6, 2 as well as the availability of N, P and K were high, with the result of the weight is 47.90 to 49.88 1000 seeds/g.

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