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Potential of Lamun *(Enhalus acoroides)* Seeds from West Seram Coastal Area as Natural Antioxidant.

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ABSTRACT

Some of Maluku's coastal traditional residents believe that the seed of sea grass from species *Enhalus acoroides* which broadly grown in Maluku is able to enhance imunity against disseases. However the nutritional facts and potentials of sea grass seeds in enhancing immunity is not largely been studied in the state. This study aimed at measuring the antioxidant level of *E. acoroides* seed and the quality of the sea grass habitat (physical, chemical and biological charracteristic) in coastal area of West Seram district, Maluku. Methods used were *diphenylpicrylhydrazil* (DPPH) free radical scavenging assay for measuring antioxidant IC-50 level, and observation and measurement for the charracteristic of *E. acoroides* habitat in two coastal village in West Seram district, Maluku. It was found that the average antioxidant level (IC-50) of *E. acoroides* seed in both area were 35.73 ppm and 45 ppm (< 50 ppm) which indicated a very strong antioxidant activities. The average for each parameter of both habitat charracteristic were quality of coastline water: oxygen level 7.02-11.24 mg/l, pH 6.84-7.22, temperature 27.27- 27.83 ^{o}C, salinity 32.47– 32.93‰, current velocity 0.03-0.06 m/sec and water brightness 0.37-0.73 m. Both habitats were dominated by sandy sediment and muddy-sand sediment, while the average level of surface phos-phate 0.0073 mg/l- 0.0076 mg/l, sediment phosphate 0.0128- 0.0168 mg/l, surface nitrite 0.0021-0.0172 mg/l and sediment nitrite 0.0121-0.0144 mg/l. This numbers indicated that the habitats were optimal for the growth of *E. acoroides.* It can be concluded that *E. acoroides* seeds taken from two optimum habitats in coastal village of West Seram district have strong potential of antioxidant activities which can be used to treat various oxidative stress related diseases.

Keywords: Lamun**,** *Enhalus acoroides,* natural of antioxidant, West Seram District

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INTRODUCTION

Treatment to diseases is not only curative with conventional medicine, but can also preventive and promotive through immune system defence, especialy in endemic area. A number of traditional Maluku coastal residents believe that sea grass seed of *Enhalus acoroides* kind, grow spreadly in Maluku is able to promote immune system. Therefore, in its harvest time (September-December) people will take and prepare the sea grass as vegetables. However, among the coastal residents the nutritional facts of seagrass seeds were not well recognized and its economic value was still under acceptance although many studies had shown the benefits of *E. acoroides* seeds.

Previous study confirmed that *E. acoroides* seeds consist of high nutritions, which are carbohydrate (59,26%), protein (5,65%) and fat (0,76%) [1]. Moreover, *E. acoroides* also has a high antioxidant level [2]. A study of Kanan [2] reveal that metanol extract of sea grass seeds from *Halodule pinifolia, H. pinifolia*, and *Enhalus acoroides* kinds have high antioxidant potentials (75%). Rough extract of *E. acoroides* that contains polysaccharide and other substances has been known to have activities like antivirus (CVB3, HSV-1) [4], antibacterial, and insulin secretion activation [5]. Nutritional facts and bioactive potential of *E. acoroides* seeds from all Maluku region as antioxidant has not yet scientificaly analised. Limmited information of the potential was derived from West Seram and Central Maluku coastal area (Waai). However, the connection between the bioactive potential of *E. acoroides* with character of habitat, physically and chemically is unknown. West Seram is one of islands regencies in Maluku, where which from preliminary study, is known to have various sea grass habitat. The charracteristics of sea grass habitat are important factor for the sustainable live of sea grass. Optimum biologic, phisic and chemic parameters are highly demanded for sea grass to nurture. It is known that physical and chemical factors of its habitat affects the nutritional and antioxidant potential of sea grass. Therefore, in order to further developing and expanding the use of sea grass seeds as health supplement and immune modulator in coastal resisdents, advance study is needed the area of sea grass habitat and its charracteristic. This study aimed at identifying the charracteristic of seagrass *E. acoroides* habitat and the antioxidant potential of sea grass seed used by West Seram coastal residents.

METHODS

This study is quantitative descriptive study through measurements of habitat charracteristics and antioxidants level of sea grass *E. acoroides* from 2 West Seram coastal areas (Osi island and Hatu village) during the period of September-December 2014.

Habitat charracteristics were measured in two parameters which is physical and chemical. Physical parameters (temperature, salinity, pH and diluted oxygen/DO) were measured in situ using Horiba instrument model U-5000G. Chemical parameters (phosphate and nitrite) were analised using spectrophotometer [6]. Antioxidant level of seagrass seeds was measured using *diphenyl-2- picrylhydrazyl* (DPPH) methods [7].

RESULTS

Habitat charracteristics of sea grass *E. acoroides* were measured in 3 (three) stations in Osi island and Hatu village in West Seram (Fig 1.)

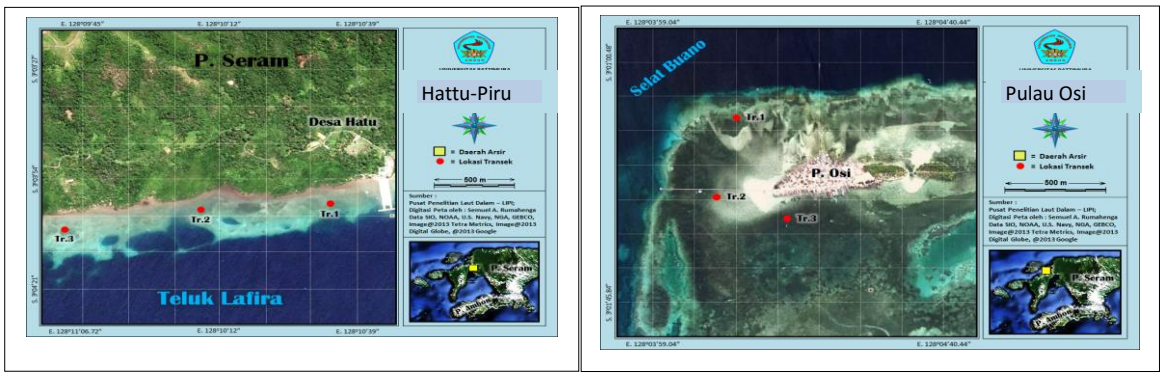

Figure 1: Map of measurement location of sea grass habitat in West Seram (left: Hatu village, right: Osi island)

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Quality of sea grass habitat

Analysis of physical parameters is shown in Table 1. Average measures in Osi island were: oxygen 11.24 mg/L, pH 7.15, temperature 27.27°C, salinity 32.47‰, water brightness 0.73m, and current velocity 0.33 m/sec. Meanwhile, the avarage measures of oxigen in Hatu village were 7.02 mg/L, pH 7.22, temperature 27.83°C, salinity 32.93‰, water brightness 0.37m, and current velocity 0.063 m/sec (Tabel 1, Fig .2).

Table 1: Measurement of the quality of sea grass habitat in Osi island and Hatu village, West Seram

Parameters	Location and average level							
	Osi island			Average	Hatu village			Average
	1	2	3		1	2	3	
Oxygen (mg/l)	10.73	11.92	11.06	11.24	7.00	6.99	7.06	7.02
pH	6.910	6.79	6.82	6.84	7.15	7.23	7.29	7.22
Temperature (°C)	27.150	27.14	27.52	27.27	27.66	27.61	28.23	27.83
Salinity (‰)	32.50	32.3	32.6	32.47	33.5	33.5	31.8	32.93
Water brightness (m)	0.70	0.8	0.7	0.73	0.50	0.25	0.35	0.37
Current velocity (m/det)	0.03	0.04	0.03	0.33	0.06	0.06	0.07	0.063

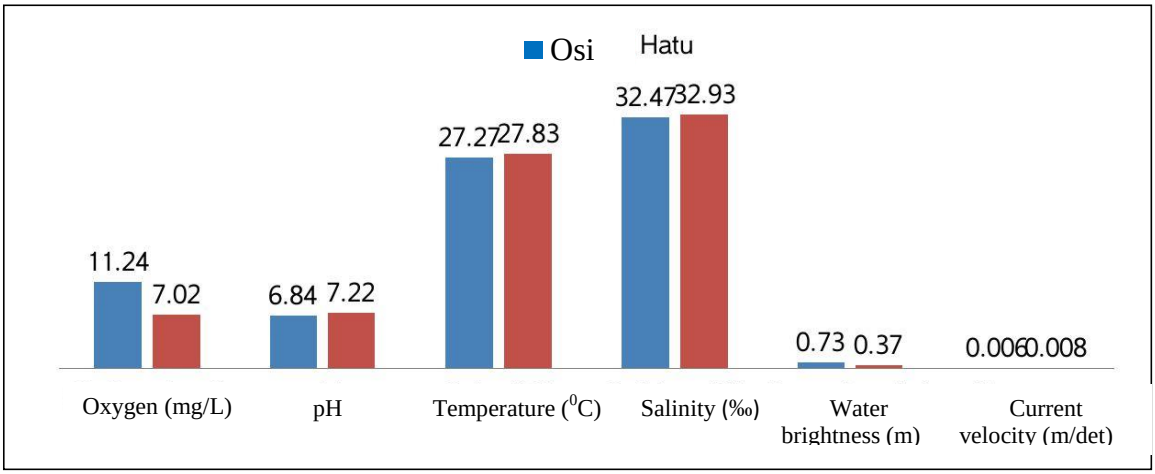

Figure 2: Physical quality of sea grass habitat in Osi island and Hatu village, West Seram

Regarding physical charracteristic, as shown on Table 2 and Figure 3, sediment composition is dominantly sandy (Ø (125 - 2000 µm) in both location.

Table 2. Sediment composition in Osi island and Hatu village coastal area

Sediment composition in Osi Island and Hatu Village coastal area				
Sediment composition (%)				
Location	Station	Thick mud-sandy	Sand	Mud
		Ø (>4000 µm)	Ø (125 - 2000 µm)	Ø (<63 - 8 µm)
Osi island	1	4.41	84.24	11.35
	2	8.4	74.3	17.3
	3	4.67	85.23	10.1
Hatu village	1	14.93	62.98	22.09
	2	15.12	61.59	23.29
	3	12.9	70.01	17.09

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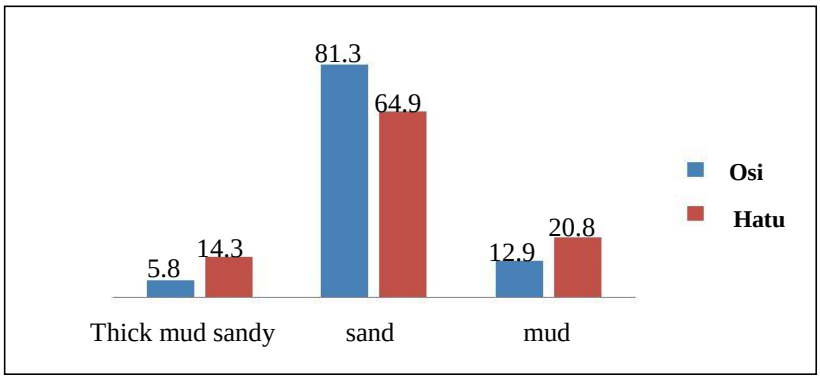

Figure 3. Percentage of sediment composition in Osi island and Hatu village coastal area

Regarding chemical charracteristics, level of surface and sediment phosphate and nitrate were drawn and shown on Table 3.

Table 3: Chemical charracteristics level of surface and sediment phosphate and nitrate (ppm) in Osi island and Hatu village coastal area

Parameters (mg/l)	Location							
	Osi island			Average	Hatu village			Average
	1	2	3		1	2	3	
Surface phosphate	0.0069	0.0073	0.0081	0.0074	0.0073	0.0077	0.0079	0.0076
Sediment phosphate	0.0112	0.0115	0.0158	0.0128	0.015	0.0169	0.0185	0.0168
Surface Nitrate	0.0059	0.0109	0.0079	0.0082	0.0031	0.0049	0.0065	0.0049
Surface Nitrate	0.0142	0.0172	0.049	0.0268	0.0125	0.0144	0.0093	0.0121

Antioxidant potential of sea grass

The average IC-50 antioxidant level of sea grass seeds taken from Osi island and Hatu village were 35.73 ppm and 45.0 ppm. Regarding the antioxidant activity, both of the sample were categorised as having a very high antioxidant level, due to their IC_{50} below 50 µg/ml [8-9].

DISCUSSION

According to Table 1 and Figure 2, level of diluted oxygen (DO) in the sea shore in study location were ranged from 7.02 mg/l to 11.24 mg/l. High and acceptable level of diluted oxygen was found in both area. A slight fluctuation of DO in both area was likely happening due to difusion of oxygen from the air and respiratory activities of the inhabitants of the sea grass fields. This level is suitable for sea biotic (>5 mg/L) as standardised quality arranged by Indonesian Ministry of Environment [10].

The average degree of acidity (pH) in both study location were ranged from 6.84 to 7.22 (Table 1). This findings show that both coastal area (Osi island and Hatu village) were neutral and suitable for the growth of sea grass, as stated by Phillips in Burrell & Schubell [11] that optimum pH for sea grass habitat were 7.3-9.0.

Water temperature is one of important factors affecting the growth of sea grass. According to the measurement in both location (Table 1), the average temperature ranging from 27.27 ^{o}C to 27.83 ^{o}C. This temperature is close to the optimum temperature (28 ^{o}C - 30 ^{o}C) of sea grass habitat for the nurture of sea grass[12].

As visualized in Table 1, the average water salinity of sea grass habitat in Osi island and Hatu village is ranging from 32.47‰ to 32.93‰. According to Hillman & McComb in Hillman *et al* [13] sea grass cultivation require water salinity ranging from 24‰ to 35 ‰. Thus this values are of optimum range of salinity for sea grass and coastal creatures to live and grow.

Concerning current velocity, both location as seen in Table 1 average 0.03 m/sec to 0.06 m/sec. This velocities are relatively tranquil because of their location in semi closed coastal area. This tranquil water also affected by the shallow water where which sea grass habitats exist. According to previous studies by Lanuru [14], optimum current velocity for growing sea grass is ranging from 0.03 m/sec – 0.05 m/sec to 1.1 m/sec – 2.6 m/sec.

According to Table 2 and figure 3, it is known that the average sediment composition in Osi island and Hatu village dominated by sandy and muddy sediment. In Osi Island the sediment is 81.28% sand and 12.92% mud. Simmilarly, in Hatu village the sediment is 64.86% sand and 20.82% mud. Although sea grass is able to grow in many kind of substrate, a wide ecosystem of sea grass is often found in thick mud-sandy substrate [15-17]. Thus, sediment composition in this study location were most likely suitable for the growth of sea grass.

As seen in Table 3, surface level of phosphate in sea grass field in Osi island and Hatu village are ranging from 0.0074 mg/l - 0.0076 mg/l, while the average sediment level of phosphate are ranging from 0.0128-0.0168 mg/l. Touchette & Burkholder [18] categorized phosphate level as indicator of fertile habitat into high (0.051mg/l – 0.10 mg/l), medium (0.02 mg/l – 0.051 mg/l) and low (0-0.02 mg/l). Therefore, sea grass habitats in this study are of medium level of fertility.

Surface level of nitrate in sea grass field in Osi island and Hatu village are ranging from 0.0049 mg/l - 0.0082mg/l, while the average sediment level of phosphate are ranging from 0.0121 mg/l -0.0268 mg/l. According to Izumi[19] nitrate level that verify fertility are as follow: 0 – 1mg/l oligotropic, 1 mg/l-5 mg/l mesotropic, and 5mg/l – 50 mg/l eutropic. Thus, nitrate levels in this study location indicate oligotropic habitats. Regarding the antioxidant activity, sea grass seed sample from both of this study location were categorised as having a very high antioxidant level, due to their IC_{50} below 50 µg/ml [8-9].

CONCLUSION

It can be concluded that sea grass *E. acoroides* habitat characteristics in West Seram coastal area (Osi island and Hatu village) in parameters environmental qualities (oxygen, pH, temperature, salinity, brightness and current velocity) and nutrient amount (nitrate and phosphate) is optimal in supporting and nurturing the growth of sea grass. Sea grass seeds that were prepared by West Seram coastal residents as food have a very high antioxidant level.

REFERENCES

[1] Badui D. Analysis of fruit nutrient of seagrass *E. acoroides* and the relationship between knowledge, perception with seagrass utilization as alternative sources of food for Waai community Salahutu district, Central of Maluku. Thesis, not publication. State University of Malang. 2010. Retrieved from http://karya-ilmiah.um.ac.id/index.php/disertasi/ article/view/8025:pp 132-134.

[2] Qi Sh, Zhang S, Qian P. Wang BG. Botanica Marina 2008; 5: 441-447.

[3] Kanan RR, Arumugam R, Meenakshi S, Anantharaman P. International Journal of ChemTech Research 2010; 2 (3): 1526-1530.

[4] Riniatsih I, Setyati WA. Indonesian Journal of Marine Sciences 2009; 14:16-22.

[5] Ismail MSFM, Ismail MF, Bohari N, Jalani NFM, Zamri AA, Zain ZM. International Journal of Undergraduate Studies 2012; 1: 32-36.

[6] Stricland and Parson, Nutriens and Eutrophication in Estuaries and Coastal waters. 1984, retrieved from http://books.google.co.id.

[7] Kazeem MI, Akanji MA, Hafizur RM, Choudhary MI. Asian Pasific Journal of Tropical Biomedicine 2012; 2(9): 727–732.

[8] Molyneux P. 2004. Songklanakarin Journal Science Technology 2004; 26(2):211-219.

[9] Irda F. International Journal Research Pharmacy Science 2014; 5(2): 104-111.

[10] KLH No 51 tahun 2004. Keputusan Menteri Negara Lingkungan Hidup Tentang Baku Mutu Air Laut.

[11] Burrell, DC, Schubel, JR. Sea Grass Ecosystem Oceanography. in McRoy, P and Mc Millan, C. (eds). Sea Grass Ecosystem: a Scientific Perspective. New York, Marcel Dekker, 1977.

[12] Nybakken JW. Marine Biology: an Ecological Approach, PT. Gramedia Jakarta, 1993, pp.243-246.

[13] Hillman K, Walker DJ, Larkum AWD & Mc Comb, AJ. 1989. Productivity and Nutrient Limitation of Sea Grasses. in Larkum, A.W., McComb, D.A.J & Shepherd, S.A. (eds). Biology of Sea Grasses. Netherland: Elsevier Science Publishers.
[14] Lanuru M. Bottom Sediment Characteristics Affecting the Success Seagrass *(Enhalus acoroides)* Transplantation in the Westcoast of South Sulawesi (Indonesia). 3rd International Conference on Chemical Biological and Environment Engineering IPCBEE IACSIT Press, Singapura, 2011; 20.
[15] Kiswara W, Hutomo M. Habitat dan Sebaran Geografik Lamun. Oseana. 1985; 10: 21-30.
[16] Newmaster AF, Berg KJ, Ragupathy S, Palanisamy M, Sambandan K, Newmaster SG. Journal of Ethnobiology and Ethnomedicine 2011; 7:1-17.
[17] Yunitha A, Wardiatno Y, Yulianda F. Jurnal Ilmu Pertanian Indonesia (JIPI) 2014; 19:130-135.
[18] Touchette BW, Burkholder, JM. Journal of Experimental Marine Biology and Ecology 2000; 250: 133-167.
[19] Iizumi, H, Hattori A, & Mc Roy CP. Journal Exp Marine Biology Ecology 1980; 47: 191-201.