

**ANALYSIS OF VITAMIN C IN TEA POWDER FROM  
SEAGRASS LEAVES (*Enhalus acoroides*)**

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**ABSTRACT**

The seagrass species *Enhalus acoroides* is able to live widely, especially on smooth, muddy substrates, but is also able to grow on rocky substrates. It is often found growed together with other types of seagrass, thus forming monospecific vegetation in various habitats. The aim of this research is to determine the amount of vitamin C content made from seagrass leaves. The object in this research was *Enhalus acoroides* seagrass leaf tea taken from the beach of Suli Village using purposive sampling of 1.5 kg. Seagrass tea is made in the Basic Chemistry Laboratory, Pattimura University. Vitamin C analysis was carried out at the Biochemistry Laboratory, Pattimura University. Vitamin C levels in seagrass leaf tea vary for each repetition or observation sample. In sample code C1, the sample weight (g) is 10.0520, ml Titran(I2) 8.2, Vitamin C (Mg) 7.216 and vitamin C content is 0.071%, for sample code C2 the sample weight (g) is 10, 0740, ml Titran(I2) 10.3, Vitamin C (Mg) 9.064, vitamin C content of 0.090%. Meanwhile, the average amount of vitamin C is 8.14 Mg and has a vitamin C content of 0.08%. The average value of vitamin C is 8.14 Mg, while the amount of vitamin C in seagrass leaves is 0.08%. So it is very possible that *Enhalus acoroides* seagrass can be used as a new food preparation that is rich in nutritional content.

**Keywords:** seagrass, vitamin c, nutrition.

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**INTRODUCTION**

Seagrass is a flowering plant (Angiospermae) that has one seed (monocot) and has rhizome roots, leaves, flowers and fruit. The functions and benefits of seagrass beds in shallow water ecosystems are as primary producers, biota habitat, water bottom stabilizers, sediment catchers and nutrient recyclers (Sjafriedkk, 2018). Seagrass is distributed in most coastal waters in the world, there are around 60 types of seagrass found in the world that grow in shallow sea waters that have sand or mud substrates. This seagrass consists of four tribes (families), namely the Zosteraceae, Cymodoceae, Posidoniaceae and Hydrochoraticea (Larkum et al., 2006). Of the 60 types of seagrass, there are 13 types that have been found in Indonesia, namely *Syringodium isoetifolium*, *Halophila ovalis*, *H. spinulosa*, *H. minor*, *H. decipiens*, *H. sulawesii*, *Halodule pinifolia*,

Halodule uninervis, Thalassodendron ciliatum, Cymodocea rotundata, C serrulata, Thalassia hemprichii and Enhalus acoroides (Kuo, 2007). One of them that can be used by humans is the seagrass species Enhalus acoroides.

The seagrass species Enhalus acoroides is able to live widely, especially on smooth, muddy substrates, but is also able to grow on rocky substrates. The seagrass species Enhalus acoroides is often found growing together with other types of seagrass, thus forming monospecific vegetation in diverse habitats. The Enhalus acoroides type of seagrass can be processed into food and drinks that are suitable for consumption, but until now the management of the Enhalus acoroides type of seagrass as a food ingredient has not been utilized optimally (Badui, 2010). This potential, if developed properly, will have an impact on the economy of coastal communities. However, seagrass plants have not been exploited for economic or commercial value so far. This is because people, especially in coastal areas, in their daily lives, only use the fruit and seeds of seagrass plants as food. Therefore, wider exploration of Enhalus acoroides seagrass leaves is very necessary as a form of new raw material in the food industry to meet people's needs, namely by using seagrass leaves as a raw material for making tea.

Tea as a beverage, refreshing and healthy ingredient is one of the commodities of Indonesian plantations. Tea products in Indonesia are generally obtained from the processing of tea leaves of the Assam variety Camellia sinensis L. The Assam variety contains more catechins (polyphenols) than the sinensis tea plant, which is widely consumed in China and Japan. Tea leaf processing is intended to change the chemical composition of fresh tea leaves in a controlled manner, so that it becomes a processed product that can bring out the desired properties in the brewed water such as good color, taste and aroma and is liked by the public. The types of tea products produced include: black tea, green tea and fragrant tea (Bambang, 1995). Tea also has many ingredients, one of which is vitamins. Vitamin C is a compound that is really needed in the body's metabolic reactions. Lack of vitamin C in the food consumed can cause a decrease in the body's immune system. The amount of nutritional adequacy of daily vitamin concentrations related to health must be adjusted to the body's resistance to disease and as an anti-oxidant that neutralizes the Recommended Daily Allowance (RDA), (Yuliarti, 2009), Vitamin C is a water-soluble vitamin and is often used as a supplement. The function of vitamin C can increase the power of free radicals in the blood and fluids. Vitamin C analysis can be done quantitatively and qualitatively. Quantitative analysis was carried out to determine the presence or absence of vitamin C in the sample.

Research on seagrasses in Indonesia is generally still oriented towards their distribution, diversity and ecological aspects (Wagey 2013). Studies on seagrass organic compounds and their use are still very lacking. Several studies regarding bioactive content have been carried out using seagrass as basic ingredients. Seagrass leaves contain flavonoids, tannins, quinones, saponins, and steroids or triterpenoids (Maryati et al, 2007). Meanwhile, research on seagrass tea (Enhalus tea) was carried out by Inayah et al. (2019), and Tehubijuluw et al. (2018). Research by Inayah et al (2019) explained the organoleptic test for Enhalus tea based on the drying method and the level of morphological maturity of the leaves, while the research of Tehubijuluw et al. (2018) explained the analysis of flavonoid levels in seagrass leaf tea (Enhalus acoroides) based on the level of leaf maturity. Research on vitamin C in seagrass leaf tea has not been carried out, therefore this research is focused on analyzing vitamin C levels in seagrass leaf tea.

## METHOD

This research is a laboratory experiment to determine the levels of vitamin C in Enhalus acoroides seagrass tea products. Sampling site for *Enhalus acoroides* seagrass leaves in Suli Village, Central Maluku. Seagrass tea is made at the Basic Chemistry Laboratory, Pattimura University, while vitamin C analysis is at the Biochemistry Laboratory, Pattimura University. This research was conducted from 11 May to 11 June 2023.

### Research procedure

1. Stage of sampling *Enhalus acoroides* seagrass leaves carried out in Suli Village, Maluku with sampling criteria, namely 3 leaves from the roots.
2. The stage of make *Enhalus acoroides* seagrass leaf tea which is carried out in laboratory
3. Extraction stage of *Enhalus acoroides* seagrass leaves.
4. The vitamin C level test stage is carried out in the basic chemistry laboratory Pattimura University. Make Enhalus tea is adapted to making seagrass tea (Harfalien et al, 2018), with the process being:

- a) Collecting basic ingredients from *Enhalus acoroides* seagrass leaves with dark green leaves in the coastal area of Suli village.
- b) Seagrass leaves are separated from the stems.
- c) Seagrass leaves are washed 3 times until clean.
- d) Seagrass leaves are placed to wilt in the room for 24 hours, after withering the seagrass leaves are cut into small pieces.
- e) Put the seagrass leaves in the oven at 60°C for 2 days.
- f) Dry seagrass leaves are blended until they become powder and weigh 5 grams.
- g) Seagrass leaves that have become powder are put into a beaker filled with 500 ml of hot water.
- h) *Enhalus* tea steeping water is boiled then filtered and poured into a glass.

evaluation of vitamin C (Slamet Sudarmadji et al. 1989)

- a) Take 5 grams of sample then add 100 ml of distilled water
- b) Then extracted for 6 hours at a temperature of 50-60°C
- c) Filter the extracted mixture until you get the filtrate
- d) Add 2 ml of 1% patti solution
- e) Then titrate with I% N solution until a colored solution is obtained
- f) Calculation of total vitamin C using the formula:

$$\text{kadar vitamin C (mg/100gr)} = \frac{I^2 \times 0,88 \times Fp}{W \text{ sample (g)}} \times 100$$

## RESULTS AND DISCUSSION

Vitamin C is a water-soluble vitamin with units (Mg) while for Vitamin C Content it is the level of purity or how much vitamin C content is in units (%) or Mg/100gram. The results of the analysis of vitamin C levels in seagrass leaf tea can be seen in table 1.

Table 1. Results of analysis of vitamin C levels in seagrass leaf tea

No	Sample code	Sample weight (g)	mL Titrant (I2)	Vitamin C (Mg)	Vitamin Levels (%)
1	C1	10,0520g	8,2 ml	7,216 Mg	0,071%
2	C2	10,0740g	10,3 ml	9,064 Mg	0,090%
			mean	8,14 Mg	0,0805%

Vitamin C levels in seagrass leaf tea vary for each repetition or observation sample. In sample code C1, the sample weight (g) is 10.0520, ml Titrant(I2) 8.2, Vitamin C (Mg) 7.216 and vitamin C content is 0.071%, for sample code C2 the sample weight (g) is 10, 0740, ml Titrant(I2) 10.3, Vitamin C (Mg) 9.064, vitamin C content of 0.090%. Meanwhile, the average amount of vitamin C is 8.14 Mg and has a vitamin C content of 0.08%. Vitamin C is a water-soluble vitamin in units (Mg), while the Vitamin C content is the level of purity or how much it contains. vitamin C in units (%) or Mg/100 grams. Second, the difference between vitamin C levels and levels is influenced by changes in the weight of the samples studied.

Tea is a very popular drink among Indonesian people (Astawan and Kasih 2008). Tea processing only uses tea leaves (*Camellia sinensis* L.). Therefore, there is a need for innovation in the food sector, especially making tea by using *Enhalus acoroides* seagrass leaves as a new raw material for making tea. The specialty of *Enhalus acoroides* seagrass is that it has high nutritional content, one of the ingredients found in tea made from *Enhalus acoroides* is Vitamin C. Vitamin C is the most effective antioxidant which has the advantage of strengthening the body's resistance. It is a vitamin that is easily soluble in water, high amounts of vitamin C are usually found in vegetables and fruit, vitamin C is also known as ascorbic acid (Anggreani. 2020). Ascorbic acid, which is water soluble, is made from hecosa derivatives and is easily damaged by heating. Ascorbic acid or vitamin C has a chromophore group, namely the benzene ring, which can interact sensitively to light stimulation as an electromagnetic radiation. Apart from that, this ascorbic acid acts as a compound that has antioxidant properties to form a defense against free radicals (Badriyah & Manggara, 2015).

Analysis of Vitamin C content in seagrass (*Enhalus acoroides*) uses old seagrass leaves, old leaves are used because old leaves contain a lot of chemical content. According to research (Setiawati, 2016) chlorophyll levels will increase with age until the leaves are fully developed. Research (Devy, 2010) states that in young leaves, the flavonoid content is still low, then increases as the leaves get older, where photosynthesis occurs optimally. Analysis of Vitamin C content in seagrass (*Enhalus acoroides*) using the Iodometric titration method (direct titration). This titration is a redox reaction-based titration that uses I<sub>2</sub> solution to oxidize the analyte. Iodine is not a very strong oxidizing agent, so only substances that are strong enough as a reducing agent can be titrated. This research uses a starch indicator which changes color to blue, vitamin C with ions bonding to carbon atoms number 2 and 3, which results in the loss of double bonds. The starch indicator used is an indicator that is widely used in iodometric titrations. The end point of the titration can be determined based on the formation of the dark blue starch I<sub>2</sub> complex. This is because the glucose units present in the starch solution form helical chains, with the configuration of bonds in each glucose unit in the spiral, causing the complex to have a dark blue color. (Elfariyanti et al, 2022). Experimental analysis of vitamin C content in seagrass leaf samples. The initial treatment is to make a filtrate from filtered seagrass leaf juice. The filtrate was then diluted to 2 ml, after that 10 ml of sample was put into an Erlenmeyer flask and 1% starch indicator was added, then titration was carried out with 0.01 N iodine solution. The titration process reached the end point, namely the color change from a clear solution to dark blue.

## CONCLUSION

Vitamin C content in seagrass leaf tea with sample code TL C1 Sample weight (g) is 10.0520, ml Titran(I<sub>2</sub>) 8.2, Vitamin C (Mg) 7.216 and vitamin C content is 0.071%, for sample code TL, C2 Sample weight (g) was 10.0740, ml Titran (I<sub>2</sub>) 10.3, Vitamin C (Mg) 9.064, vitamin C content was 0.090%. The average value of vitamin C is 8.14 Mg, while the amount of vitamin C in seagrass leaves is 0.08%. So it is very possible that *Enhalus acoroides* seagrass can be used as a new food preparation that is rich in nutritional content.

## REFERENCE

- Anggreani, N. 2020. Analysis of vitamin C levels in local oranges in Bengkulu Province, scientific journal pharmacy,7.
- Astawan, M and Andreas Leomitra Kasih. 2008. The Benefits of Colorful Foods. Jakarta: Gramedia Pustaka Utama. Pg.31-32
- Badria, S. 2007. Growth rate of seagrass (*Enhalus acoroides*) leaves on two different substrates.
- Badriyah, L., & Manggara, A.B. 2017. Determination of vitamin C levels in red chilies (*Capsicum annum*) using the spectrometric method.
- Badriyah, L., & Manggara, A. B. 2015. Determination of Vitamin C Levels in Red Chilies (*Capsicum annum* L) Using the Uv-Vis Spectrophotometry Method. Wiyata Journal, 2(1), 25–28
- Badui, D., 2010. Analysis of nutritional levels of seagrass fruit (*Enhalus acoroides*) and the relationship between knowledge, perception and the use of seagrass fruit as an alternative food source for the community of Waai Village, Kec. Salahutu District. Central Maluku. UM Postgraduate Program Dissertations and Theses.
- Bengen, D.G. 2001. Synopsis of Ecosystems and Natural Resources and Oceans and Management Principles. Center for Coastal and Marine Resources Studies-LPB Bogor.
- Fediuk K., N. Hidiroglou, R. Madere, And H.V. Kuhnlein. 2002. Vitamin C In Inuit Traditional Food And Women's Diets. J. Food Comp. Anal., 15(3):221-235.
- Frasiandini, I., Puspitawati, R.P., Indah, N.K. 2012. Morphological Structure and Anatomy of *Syringodium isoetifolium*. Bio Lantern. Vol. 1 No. 2 Pg 67-74
- Gustur G., Dharmano, Sri. 2019. Validity of the Ethnobotany Book on *Maranthus carymbosa* plants in the Tamiang hill forest area, Tanah Laut Regency. Journal of Biology-Educational Innovation. Vol.1.
- Hasanudin, R. 2013. Relationship between density and morphometrics of *Enhalus acoroides* seagrass and substrate and nutrients on Surappo Lompo Island, Pangkep Regency. Thesis at the Faculty of Marine and Fisheries Sciences, Hassanudin University, Makassar.
- Hendra, 2011. Growth and Biomass Production of Seagrass Leaves *Halophile ovalis*, *Syringodium isoetifolium* and *Halodule uninervis* in the Seagrass Ecosystem in the Waters of Barrang Lompo Island. Thesis. UNHAS. Makassar.

- Ika sustainable., 2013. Development of competency-based teaching materials. Padang Akademia gem.134.
- Inayah, S.N., Heremba, W.N.M.J., Samloy, Y., Tuapattinaya, P.M.J. 2019. Organoleptic Test of Enhalus Tea Based on Drying Method and Morphological Level of Leaf Aging. Scie Map J, Vol.1, No.2. Pg 65-72
- Larkum, A.W.D., R.J. Orth, and C.M. Diaarte. 2006. Seagrass: Biology, Ecology And Conservation. Springer 5cNetherlands.
- Maryati, S.I., Fidriany, and K. Ruslan. 2007. Study of the Chemical Content of Avocado Leaves (*Persea Americana* Mill) S1 Thesis. ITB School of Pharmacy.
- Muskitta, M., 2016. Analysis of protein levels in *Acoroides* milk based on temperature and time Storage. Biology Education Study Program Thesis, FKIP, Pattimura University (unpublished).
- Narins, D.M.C. 1989. Vitamins in Krause's Food, Nutrition and Diet Therapy. Mahlan, L.K, Pages 110-114.
- Nurdyansyah, N. Eni Fariyarul Fahyuni. Innovation. 2016. Learning model according to the 2013 curriculum. Sidoarjo .Nizamia learning center.
- Nurzahraeni. 2014. Diversity of Types and Conditions of Seagrass Fields in the Waters of Panjang Island, Derawan Islands, East Kalimantan. Thesis, Department of Marine Science, Faculty of Maritime Affairs and Fisheries, Hasanudin University, Makasar.
- Ohorella, H. 2011. Analysis of Phosphate Content and Its Relationship with the Growth Rate of *Enhalus Acoroides* Seagrass Leaves. Thesis. Department of Marine Science. Hasanuddin Faculty of Marine Sciences, Makassar.
- Pahlivan, F. E, 2017. Vitamin C: An Antioxidant Agent. Chapter From The Book Vitamin C. pp.
- Philips R.C.E.G. Menez .1988. Seagrass in : smithsonian contribution to the mariane .science no 34 .smithsonian institution press .washington .D.C .
- Rohdiana, D. 2015. Tea: Process, characteristics and functional components. Foodreview Indonesia 10 (8): 34-37.
- Wakano, D. 2014. Inventory of Seagrass Types in the Coastal Waters of Waai Village and Liang Village. In Proceedings of the National Seminar on Basic Science VI (Pp.415-420). Ambon FMIPA Pattimura University. ISBN: 978-602-97552-1-2.