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EXTRACTION AND CHARACTERISTICS OF EDIBLE SALTS FROM *SALICORNIA BRACHIATA* L

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Abstract
Herbal salt is a natural plant salt, no additive and other chemical substance, with low sodium, natural saline taste and full of organic nutrition. Besides salts like, sodium, potassium and calcium these halophytes accumulates a lot of minor elements such as iorn, iodine and cupper. The halophyte salt was prepared by fresh sample, dry sample and grinding methods and their characteristics were tested. The yield of salt was determined by averaging three replicates measurement of salt quantity obtained from Salicornia brachiata L. The highest salt (14.16g) was extracted in the 500g of Salicornia brachiata L leaves in the dry sample salt method and lowest salt (1.62g) was extracted in the 100g of Salicornia brachiata L leaves in the fresh sample salt to compare with other methods. In the grinding methods, to extract the edible salt from various concentration of halophyte leaves extract with distilled water. The content of Na, K, Ca and Mg of the Salicornia brachiata L salt were analysed.

Key Words: Herbal Salt, Halophytes, Salicornia Brachiata L, Fresh Sample, Grinding Method.

Introduction

Salt plants grow on coastal marshes are tolerant to varying saline concentration and have ability to colonise areas characterized by regular flood, shifting sedimentation patters and hydraulic power of waves. They grow in shallow gradients, mud flats and drainage channels. Once established a salt marsh may develop series of zones described as high marsh, middle marsh and low marsh. *Salicornia* is one of the most salt tolerant plants in general, capable of growing under highly saline conditions on salt marshes and can accumulate 30-40 % NaCl in its dry weight resources for stress responsive genes. Fresh *Salicornia* can be eaten raw or quickly fried, is the world's saltiest edible vegetable. These plants catch mud and help builds up the marsh. Their leaves absorb lot of salt and eventually turn red when oversaturated. Salt affected soils with high electrolyte contents limit the development of the majority of plants and serve as a habitat only for such species that can survive the conditions.

Salt is an essential for maintenance of human physiological functions, such as the adjustment of cell membrane potential and blood pressure and also widely used as a preservative for various food materials. *Salicornia* recently receive more attention for its effectiveness on hypertension, heart diseases, cardiovascular diseases, diabetes and constipation like organic disorders or improper diet. Of particular interest with respect to its potential for exploitation, significant salt accumulating properties, indeed the vacuole can tolerate 500-600 mM salts (Maathuis *et al.,* 1992), allowing its cultivation in highly saline lands with the intention, after repeated cropping, of extracting salts from the soil (Flowers *et al.,* 1977 and Ravinndran *et al.,* 2007).

The only notable studies have been those on the production structure of rock salt and purified salt (Jeong, 1988), the composition of mineral and characteristics of different types of salt (Jo *et al*., 1988a). The salt contains various kinds of mineral such as potassium and calcium. In particular, potassium can be used to replace salt in various fermented food which will reduce the excessive intake of salt (Supphsorn *et al.,* 1987). Since some edible seaweed is known to contain trace elements and functional polysaccharides (Fuji *et al*., 1992 and Choi *et al*., 2000). The content of K and Mg in the *Salicornia herbacea* salt was higher than the results of Lee and Kim (2008). The composition of minerals in the *Salicornia herbacea* salt prepared by extraction, the content of Na, Mg, K and Ca increased with the mixing ratio of seawater increased (Su-Hyun Lee *et al*., 2009). Thus the present study focuses on the preparation of salt from *Salicornia brachiata* L using as different extraction methods and their characteristics were also analysed.

Materials and Methods

Collection of Plant

Salicornia brachiata L was collected from coastal area of Nagapattinam. After sufficient drying, the *Salicornia brachiata* L was cut into a size of 5 mm or crushed and passed through a 40 mesh sieve.

Preparation of Bio salt

The bio salt prepared from *Salicornia brachiata* L using fresh sample salt method, dry sample salt and grinding method (Kim *et al.,* 2004). For the fresh sample salt method, 100g to 500g of leaves fresh weight mixed with distilled water, and was filtered with Whatman No.1 filter paper. The residual insoluble matters were added to the filtrate and washed 2-3 times with 50mL distilled water. Then they were air dried for 24 - 36 hrs.

For the preparation of Salicornia *brachiata* L salt by dry sample method, 100 g of leaves fresh weight and it dried at 105°C after they were mixed with 40 ml distilled water and extraction was processed for 2 hrs in a water bath at 100°C. The extracts were filtered with Whatman No.2 filter paper. Next, the collected filtrates was filtered second time with the same quantity of distilled water and dried at 100°C to produce Salicornia *brachiata* L salt.

In the grinding method of salt preparation, 350 g of fresh leaves was grinding by mortar and pistol with 90 ml of distilled water. Then the homogenate was centrifuged at 3000rpm for 10 minute. After centrifugation, green extract was filter and allow the air dried. After few hours the solidified salt crystals were collected. For the above methods, to compare the various concentration of leaves sample to mixed with distilled water and produce the different quantity of edible salts.

Elemental analysis

The content of Na, K, Ca and Mg of *Salicornia brachiata* salt was measured using Inductively Coupled Plasma Atomic Emission Spectrophotometer (ICP) with a 0.1 % solution as the direct analysis sample.

Results and Discussion

From Table 1 it is evident that the fresh sample salt method, 100 g, 200 g, 300 g and 500 g of *Salicornia brachiata* L. fresh leaves, the obtained salt quantity was increased in 1.92 g, 3.88 g, 5.22 g and 13.14 g respectively. In the dry sample salt method, 19.28 g of dry weight of *Salicornia brachiata* leaves was produce the 1.62 g of edible salt. Regarding this, the increasing dry weight (99.18 g) of *Salicornia brachiata* leaves was produce the increasing quantity of edible salt (14.16 g) (Table.2). According to the results of grinding method, the increasing quantity like, 350 g, 500 g, 850 g and 1000 g of fresh leaves weight to produce the increasing quantity of edible salt in 6.28 g, 13.08 g, 20.23 g and 28.12 g respectively (Table.3). Kim *et al.,* (2007) also reported that the preparation of functional salts with seaweed ingredients. In the present study revealed that the different extraction methods used for the extraction of edible salt from herbacea. Kim *et al.,* (2004) reported that, preparation salt form seaweed by incineration and drying methods. Su-Hyun *et al.,(*2009) estimated that the yield of salt from incinerating at 800°C decreased, but the purity of the salt increased compared to the salt obtained from incinerating at 700°C. The yield of salt increased as the mixing ratio of distilled water increased (Table.1 to 3). Su-Hyun *et al.,(*2009) reported that the content of K and Ca were higher in the salt extracted with seawater, but the content of Mg was higher in the salt extracted with distilled water.

The content of Na was highest, followed by Potassium and then Calcium, and there was small quantity of Mg as well. Higher quantity of Na, K, Ca and Mg were obtained from the dry weight sample method. The lower quantities of minerals were obtained from fresh sample salt method (Table.4). The sea weed salt produce increased contents of K and Ca. However, there was not much difference in the content of heavy metals between sun-dried salt (Kim *et al.,* 2003a). Similar results of the study by Ha and Park (1998) which reported that the highest content of minerals in sun-dried salt was Na followed by K and then Ca. The content of K and Mg in the *Salicorni herbacea* salt was higher than the results of Lee and Kim (2008).

Conclusion

The present investigation indicates that halophytes edible salt were prepared in the leaves of *Salicornia brachiata* L. from the results, it is discernible that halophyte edible salt quite evidently regularised the health. Salt has always been valuable and people have long been on the search for the healthiest salt for mankind. That is why it so important to consume the right minerals for healthy metabolic activity. For salt, it is consuming plant derived organic salt and avoiding non plant derived inorganic mineral salt, it will be a big boon to all. The halophyte edible salt are fully developed for commercial use, it will lead to a healthier and more rewarding life.

Table 1. Quantification of halophytes edible salts of *Salicornia brachiata* L. from fresh sample salt method

Leaves fresh weight (g)	Distilled water (ml)	Obtained salt (g)
100	50	1.92
200	100	3.88
300	150	5.22
400	200	8.43
500	250	13.14

Table 2. Quantification of halophytes edible salts of *Salicornia brachiata* L. from dry sample salt method

Leaves fresh weight (g)	Dry weight (g)	Distilled water (ml)	Obtained salt (g)
100	19.28	40	1.62
200	37.15	100	3.65
300	63.15	200	5.11
400	82.24	225	9.21
500	99.18	250	14.16

Table 3. Quantification of halophytes edible salts of *Salicornia brachiata* L. from grinding method

Leaves fresh weight (g)	Distilled water (ml)	Obtained salt (g)
150	90	6.28
250	120	13.08
500	160	16.23
750	220	20.23
1000	350	28.12

Table 4. Estimate the quantities of minerals from edible salt by various methods

Minerals content	Obtained salt (g)		
	Fresh sample method	Dry sample method	Grinding method
Sodium (Na)	24.45	28.23	25.42
Potassium (K)	1.25	1.32	1.26
Calcium (Ca)	0.19	0.23	0.19
Magnesium (Mg)	4.55	4.87	4.72

References

1. Choi, J. H, Kim, D. I, Park, S. H, Kim, D. W and Koo, J. G. 2000. Effects of sea tangle extract and fucoidan components of lipid metabolism of stressed mouse. *J. Korean Fish Soc*, 33, 124-128.
2. Flowers, T. J., Troke, P. F., Yeo, A. R. 1977. The mechanism of salt tolerance in halophytes. *Annual Review of Plant Biology*, 28, 89-121.
3. Fuji, T, Kuda, T, Saheki, K and Okuzumi, M. 1992. Fermentation of water soluble polysaccharides of brown algae. *Nippon Suisan Gakkaishi*, 58, 147-152.
4. Ha, J. O and Park, K. Y. 1998. Composition of mineral contents and external structure of various salts. *J Korean soc Food Sci Nut*r 27, 413-418.
5. Jeonag, K. 1998. The production system of Tol salt at guom village in Cheju Island. *J Korean Bull Geogr*, 32, 87-104.
6. Jo, E. J and Shin, D. H .1998a. Study on the chemical composition of sun dried, refined and processed salt produced in Chonbuk area. *J Fd Hyg Safety*, 13, 360-364.
7. Kim, D. H, Lee, S. B and Rhim, J. W. 2004. Characteristics of sea weed salt prepared with seaweeds. *Korean J Food Sci Technol*, 36, 937-942.
8. Kim, D. H, Rhim, J. W. and Lee, S. B. 2004. Characteristics of sea weed salt prepared with seaweeds. *Korean J Food Sci Technol*, 35,62-66.
9. Kim, Y. M , Byun, J.Y, Namgung, B, Jo, J. H and In, J. P. 2007. Studies on functional salt fortified with seaweed components. *Korean J Food Sci Technol*, 39, 152-157.
10. Lee, Y. K and Kim, S. D. 2008. Recrystallization charecterstics of solar salt after removing of bittern and impurities. *Korean J Food Sci Techno*, 37, 203-209.
11. Maathus, F. J. M., Flowers, T. J., Yeo, A. R. 1992. Sodium chloride compartmentation in leaf vacuoles of the halophyte *Suaeda maritima* (L) Dum and its relation to tonoplast permeability. *Journal of Experimental Botany*, 43, 1219-1223.
12. Ravindran, K. C, Venkatesan, K, Balakrishnan, V, Chellappan, K. P and Balasubiramaniyan, T. 2007. Restoration of saline land by halophytes for Indian soils. Soil Biology and Biochemistry, 39, 2661-2664.
13. Su-Hyun Lee, Rahim, J. W and Kim, D. H. 2009. Effect of preparation methods on the charecterstics of *Salicornia herbacea* salt. *J. Korean Soc. Appl. Biol. Chem*. 52 (3), 264-269.
14. Suphsorn, C, Ramu, M. R and Mahmood, A. K. 1987. Fatty acid and sensory acceptance of a dietry sodium potassium fish sauce. *J Agri Food Chem*, 31, 14-17.