Identification and Roles of the Taste-active Components of Dried Nori

Tokifusa KAWASHIMA1,†, Takaaki SHIRAI2, Hiroko MATSUDA2, Kazufumi OSAKO2, Emiko OKAZAKI2

1Chiba Prefectural Fisheries Research Center, 2492 Chikura-cho, Hiraio, Minamiboso, Chiba 295-0024, Japan, 2Tokyo University of Marine Science and Technology, 5–7 Konan 4, Minato-ku, Tokyo 108-8477, Japan

In recent years, dried nori with a high protein content has been commercialized as tasty produce. Although free amino acids have been examined as taste components of dried nori, the components constituting the taste of dried nori and their roles have not been identified. Therefore, we carried out a sensory evaluations to identify the taste-active components of dried nori and determine their roles in taste. The main extractive free amino acids of dried nori were Ala, Glu, and Asp. In addition to these components, Tau was also abundant. These four components accounted for 85% of the free amino acids. The main ATP-related compound was IMP. Together, these five compounds were identified as taste-active components. The role of each taste-active component of dried nori was as follows: Ala imparts sweetness, saltiness, umami, and richness; Glu imparts saltiness, umami, and richness; Asp imparts saltiness, umami, and richness; Tau imparts sourness; and IMP imparts umami and richness.

Keywords: dried nori, Taste–active components, Free amino acids, IMP

1. Introduction

Dried nori is mainly processed from the red alga, Pyropia yezoensis, which is produced throughout Japan, including Tokyo Bay, Ariake Sea, Seto Inland Sea, Ise Bay, and Matsushima Bay. Because the environment of each production area varies greatly, dried nori acquires a texture and an aroma that are unique to the area where it is produced.

Dried nori has abundant nutritional components, such as proteins, saccharides, minerals, and vitamins, and functional ingredients such as those that lower blood pressure[1,2]. However, the commercial value of dried nori is generally calculated based on color, luster, shape, and fragrance [3], whereas taste and nutritional components are not considered to be of commercial value. Therefore, there is no clear correlation between grade or price of dried nori and taste [4]. However, recently, the relationship between the protein content and quality of dried nori has been investigated, and as a result, dried nori products are now being evaluated by several factors, including protein levels, as a standard for taste [2].

Food taste is affected by physical factors, such as texture, and chemical factors such as taste, aroma, and color [5]. The food taste imparted by chemical factors is unique, based on the type and amount of various ingredients. Therefore, to identify the taste of the food, it is necessary to study the food component composition in detail.

Ito[6] and Amano[7] reported that the amino acid composition in seaweed extract varies depending on the species, season, and habitat, but alanine (Ala) and glutamic acid (Glu) are always found as free amino acids in Porphyra. Dried nori also contains abundant taste–active free amino acids such as Ala, Glu, etc. [4,8,9]. In addition, it has been reported that inosinic acid (IMP), which is the important umami component of katsuobushi, also occurs in dried nori, although the IMP value varies from 0 to 44 mg/100 g dried matter [10–15].

In addition, free saccharides, organic acids, and mineral salts have been found to be the taste–active components of dried nori[12,15–17]. However, Fujita [18] suggested that the major taste–active component was IMP, which imparted umami. However, the details of this have not been clarified yet.

It has been reported that the main components related to umami of kelp, katsuobushi and short-neck clam are Glu, IMP, and succinic acid, respectively [19–21].

Dried nori has a refreshing sweetness and weak umami. Based on the results of an analysis of the major taste components, these taste components are presumed to be free amino acids and nucleotides, as in fish and shellfish. However, the taste cannot be explained based...
on only the component content. For example, according to Take et al. [22], succinic acid is the most abundant organic acid in sergestid shrimp, but is not involved in umami, and Konosu [19] questioned the role of succinic acid as an umami of short-neck clams. Regarding the taste and umami of fish and shellfish, there have been several sensory evaluations, but there has been no research on the taste of dried nori. Therefore, in the present study, the ingredients constituting the taste of dried nori were identified, and the influence of each ingredient on the taste was examined by sensory evaluation.

2. Materials and Methods

2.1 Materials

From December 2012 to February 2013, Susabinori, Pyropia yezoensis was cultured in Tokyo Bay and dried nori manufactured in a nori processing plant of Chiba Prefectural Fisheries Cooperative Association was used as a sample.

2.2 Extract preparation and analysis of free amino acids and ATP-related compounds

After shredding the sample to 2×2 mm or less with scissors, 0.5 g was accurately weighed, transferred to a glass homogenizer manufactured by IWAKI Ltd, and 30 ml of methanol was added for grinding. After filtration through filter paper (Advantech Toyo, No. 5C), methanol in the filtrate was evaporated under reduced pressure to dry it. The concentrate was transferred to a separating funnel using 5 ml of distilled water and degreased three times using 10 ml of ether. The aqueous layer was concentrated using an evaporator and then adjusted to 20 ml to prepare an extract. Samples were extracted five times. Analysis values of free amino acids and ATP-related compounds are presented as mean±standard deviation of five measurements.

The free amino acids were measured using the ninhydrin coloring method with an amino acid automatic analyzer JLC–500 manufactured by JEOL Ltd.

The ATP-related compounds were measured using a high-performance liquid chromatograph L–6000 (HPLC) manufactured by Hitachi, Ltd. Analysis conditions of HPLC were as follows: Asahipak GS–320HQ column, 200 mM NaH₂PO₄ (pH 2.95) for mobile phase, 30°C column temperature, 254 nm detection wavelength, 0.5 ml/min flow rate.

2.3 Preparation of dried nori taste solutions

Based on the results of the analysis of free amino acids and ATP-related compounds (Table 1), a 100 ml aqueous taste test solution was prepared using amino acids the amount of which was more than or equal to 10 mg per 100 g of the dried nori sample. The composition of each taste solution is as shown in Table 2. The following seven taste solutions were prepared and used for sensory evaluations. The total taste solution (F) was composed of 11 free amino acids and taurine (Tau), which is an aminosulfonic acid. The simplified taste solution (S) consisted of the three most abundant free amino acids (excluding citrulline (Cit)) and Tau. Another simplified taste solution (S+IMP) was prepared by adding IMP to S to confirm the effect of IMP by the addition test. The simplified taste solutions (S+IMP – Tau, S+IMP – Ala, S+IMP – Glu, S+IMP – Asp) were made by removing Tau and three free amino acids (Ala, Glu, aspartic acid (Asp)) one by one from S+IMP to confirm the role of these components by the omission test.

2.4 Sensory evaluations of dried nori taste solutions

Initially, in a panel selection test [23] testees were asked distinguish 5 kinds of tastes from 5 diluted solutions of sweetness, sourness, saltiness, bitterness and umami and distilled water. The panel selection test was repeated twice for 14 people. From the panel selection test, a total of 7 panelists, 3 men and 4 women aged 20–50, who recognized 4 or more taste components were chosen. The 7 panelist had the same result in the two panel selection tests. Next, sensory evaluations were carried out by the panel. A sensory evaluation was con-

| Table 1 | Major extractive components in dried nori (mg/100 g dried matter). |
|---------|---------------------------------------------------------------|
| Tau     | 827                                                          |
| Asp     | 56                                                           |
| Thr     | 18                                                           |
| Ser     | 12                                                           |
| Asn     | 21                                                           |
| Glu     | 261                                                          |
| Gly     | 13                                                           |
| Ala     | 799                                                          |
| Cit     | 227                                                          |
| Val     | 23                                                           |
| Ile     | 10                                                           |
| Leu     | 17                                                           |
| Tyr     | 9                                                            |
| β-Ala   | 8                                                            |
| GABA    | 15                                                           |
| MEA     | +                                                            |
| His     | 1                                                            |
| Lys     | 3                                                            |
| Trp     | 3                                                            |
| Ans     | 1                                                            |
| Car     | +                                                            |
| Arg     | 2                                                            |
| Pro     | 8                                                            |
| ADP     | 10                                                           |
| AMP     | 59                                                           |
| IMP     | 318                                                          |

+: trace
ducted by a distinction taste test of solutions simulating dried nori extract to confirm the contribution of each component to the taste of dried nori using a triangle test. The distinction taste test was repeated five times (n=35), and the results were analyzed to determine if there was a significant difference using the triangle test table[23].

Next, in the taste distinction test, how the taste of the selected sample was distinguished from other two tastes was evaluated with regard to six aspects; the five basic tastes of sweetness, sourness, saltiness, bitterness and umami, and thickness were compared using the scoring method. The taste roles of each component were also investigated. The scale of taste evaluation was as follows: Weak (-2), Slightly weak (-1), Same (0), Slightly strong (+1) and Strong (+2). The taste evaluation was indicated by the average value of panel evaluation results. Identification of taste was confirmed by the following: (A) Relative evaluation of solution S to F; (B) addition of IMP; (C) omission of Ala, Glu, Asp, and Tau.

### 3. Results

Table 1 shows the analytical results of the extract components of dried nori. All figures are expressed in mg per 100 g of dried nori sample.

#### 3.1 Free Amino Acids and Tau

The major free amino acids of the extract components of dried nori were as follows: 799±246 mg Ala, 261±79 mg Glu, 56±26 mg Asp, and 227±85 mg Cit. In addition, the free amino acids observed at≥10 mg were threonine (Thr), serine (Ser), asparagine (Asn), glycine (Gly), valine (Val), isoleucine (Ile), leucine (Leu), and γ-aminobutyric acid (GABA); and 827±251 mg Tau. The following five components (Ala, Glu, Asp, Cit, Tau) were found in large amounts; accounting for≥90% of all free amino acids, including Tau.

#### 3.2 ATP-related compounds

ATP-related compounds of dried nori were as follows: 318±41 mg IMP, 10±2 mg ADP, and 59±13 mg AMP. ATP was not detected.

#### 3.3 Comparison of dried nori and simplified taste solutions

The results of the sensory evaluation are shown in Table 3. On comparing the taste of F and S, no significant

| Comparative taste solutions | Correct answers (n=35) |
|-----------------------------|-----------------------|
| (A) F vs. S                 | 10                    |
| (B) S vs. S+IMP             | 34***                 |
| S+IMP vs. S−Ala+IMP         | 29***                 |
| S+IMP vs. S−Glu+IMP         | 26***                 |
| S+IMP vs. S−Asp+IMP         | 24***                 |
| S+IMP vs. S−Tau+IMP         | 25***                 |

***: p<0.001.

(A): Comparison of solution F and S.
(B): Addition test of IMP.
(C): Omission test of Ala, Glu, Asp, and Tau.
difference was found in the taste of both taste solutions ($p<0.05$). There was no influence on the taste by removing components other than the four components of Ala, Glu, Asp, and Tau (Table 3(A)). Therefore, S synthesized with components Ala, Glu, Asp, Tau was shown to be similar in taste to F and it was confirmed that the taste of dried nori was mainly composed of these four components. The characteristics of the taste of taste solutions composed of these four components are shown in Fig. 1. The characteristics of the taste were as follows: Umami was relatively stronger than the other characteristics. Sweetness, sourness, saltiness, and thickness showed the same level of strength. The bitterness was relatively weak.

### 3.4 Taste effect of IMP by the addition test

Based on the results of the addition test of S+IMP, a significant difference was found in the taste of both taste solutions ($p<0.001$) (Table 3(B)). The taste of S+IMP is shown in Fig. 2. When IMP was added, the sourness became weak, and umami and thickness became stronger. In addition, many respondents indicated that the taste of S+IMP was closer to the taste of dried nori than S.

### 3.5 Role of Ala, Glu, Asp and Tau in taste by the omission test

The results of the omission test suggested Ala, Glu, Asp, and Tau were the taste-active components of dried nori. It was determined that there was a significant difference in all taste solutions ($p<0.001$) from which each of the four components was removed (Table 3(C)). Therefore, it was found that when either Ala, Glu, Asp, or Tau were missing, it did not have the taste of dried nori. From the results of the sensory evaluations of these four components (Fig. 3), their roles of taste in dried nori were suggested as follows: When Ala was absent, sweetness, saltiness, umami and thickness became extremely weak. The absence of Glu weakened saltiness, umami and thickness. When Asp was excluded, saltiness, umami and thickness became weak. The absence of Tau weakened sourness.

### 4. Discussion

Regarding the free amino acids of dried nori, Ala, Glu, Asp were found in relatively high amounts, and Tau was also high amounts. These results were the same as those of Noda et al. [12], Yoshie et al. [4], and Kawamura and Washio [9].

For ATP-related compounds in dried nori, Fujii [10] reported that there were few 5'-nucleotides related to taste. Regarding IMP, Fujii [10] and Araki et al. [11] suggested that the presence of IMP could not be confirmed in dried nori. However, Noda reported that “Asakusanori” had limited 5’-IMP and 5’-GMP concentrations, but these components were closely related to taste. Tashiro et al. [13,14] also reported that trace amounts of IMP in the range of 9–10 mg/100 g were found in dried nori, and Nakamura et al.[15] reported that relatively large amounts of approximately 50 mg

![Fig. 1 Sensory evaluation of the taste profile of the S- versus the F-taste solution. Refer to Table 2 for the composition of taste solutions. The score of each basic taste was expressed as the average evaluation score by panelists ($n=35$). Strong (+2), Slightly stronger (+1), Same (0) as the F taste solution, Slightly weak (−1), Weak (−2). Evaluation 0 is F.](image1)

![Fig. 2 Sensory evaluation of the taste profile after adding IMP to the S taste solution. Refer to Table 2 for the composition of taste solutions. Evaluation 0 is S.](image2)
IMP occurred in dried nori. Araki et al. [11] suggested that IMP was produced by the action of AMP deaminase when dried nori was immersed in water, even if presence of IMP could not be confirmed in it. Analysis results of ATP-related compounds in dried nori varies among researchers. However, in this study, it was confirmed that ADP, AMP, and IMP were present in dried nori; IMP which occurred in relatively large amounts was the main component of ATP-related compounds in dried nori. From the results of the sensory evaluation, it was revealed that the taste-active components of dried nori were: Ala, Glu, Asp (free amino acids), IMP (ATP-related compounds), and Tau. As shown in Fig. 2, the solution consisting of only these five components showed much stronger umami and richness; about the same sweetness and saltiness; slightly weaker bitterness, and much weaker sourness than the solution without IMP. Kuninaka [24] described the following: Glu and IMP were found to be umami components, but these umami tastes were weak when they occurred alone. However, when Glu and IMP were mixed, their umami showed a synergistic effect that produced an umami which was remarkably stronger than the sum of the strength of each individual umami. Araki et al. [8] also reported that umami of toasted nori was strongly suggested to be determined by the synergistic effect of Glu and IMP leaching from the nori. Moreover, in this sensory evaluation, umami was enhanced more than Glu alone by adding IMP to S synthesized from Ala, Glu, Asp, and Tau. This was possibly owing to the synergistic effect of Glu and IMP on umami.

Sensory evaluations indicated that the taste-active components of seafoods are mainly free amino acids, ATP-related compounds, and organic acids. In these studies, the amino acid Ala possibly contributed to sweetness in sea urchin [25], snow crab [26] and scallop [27]. In addition, it has been reported that Ala is also involved in thickness and mildness in scallops [27]. Furthermore, although Ala shows sweetness, it also has a weak umami, and it has been reported that it also shows a synergistic

![Graph showing taste components and their interactions](image-url)
effect of nucleotides and umami taste [28,29]. In this study too, in addition to sweetness, Ala was found to be involved in umami, thickness and saltiness of the taste of dried nori. Kawai et al. [28] and Kawai [29] described that this was owing to the synergistic effect with IMP.

Tau occurs abundantly in abalone, snow crab, and scallop, but is considered not to be involved in taste [30]. However, it was confirmed in this work that Tau occurred in large amounts in dried nori and contributed to sourness. In addition, since sweetness and thickness appeared strongly when Tau was removed, it is thought thatTau has an effect of relieving sweetness and thickness. Glu is contained in many fishes and shellfishes and is involved in the umami of abalone, snow crab and scallop, which also contributes to the umami of kelp [30]. Glu also occurs in many plants, such as tomato, as an umami component [31,32]. In this study, it was found that Glu was contained in large amounts in dried nori and was involved in umami, as in the case of other marine products. Furthermore, Glu was confirmed that it also contributes to saltiness and thickness.

There is no research on the taste of Asp of marine products. However, Asp is considered to be bitterness, sourness, and astringent with respect to the taste of sake, and it is an undesirable taste for sake[33]. However, Asp was recognized that it contributed to saltiness, umami and thickness in dried nori, and did not contribute to bitterness and sourness unlike taste of sake. In addition, since sweetness and sourness increased when Asp was removed, it is thought that Asp has an effect of softening these tastes.

The taste of dried nori was mainly umami, and the intensity of umami concurred with the analysis results and sensory evaluation. In this study, as shown by Fujita’s report [18], dried nori was determined to have a strong umami taste. Also, the umami that dried nori has is mainly owing to the synergistic effect of Glu and IMP. Furthermore, it was suggested that Ala also contributes to the synergistic effect of umami.

As stated above, the five compounds: Ala, Glu, Asp (free amino acids), IMP (ATP-related compounds), and Tau were identified as the taste–active components of dried nori. Although it is predicted that the taste of dried nori does not completely match the taste obtained with aqueous solution, the taste of dried nori is appreciated after mixing with saliva in mouth when eating. Therefore, the taste of S+IMP used in this study was considered to reproduce the taste which is close to the taste of dried nori. The roles of taste of each component have been found to be as follows: Ala is sweetness, saltiness, umami, and thickness. Glu is saltiness, umami, and thickness. Asp is saltiness, umami, and thickness. Tau is sourness. IMP is umami and thickness.

Acknowledgments

We thank the people of the Chiba Prefectural Fisheries Cooperative Association and Tokyo University of Marine Science and Technology Laboratory of Salad Science who cooperated in the sensory evaluation.

References

1) T. Oohusa; “Nutrition of seaweed– The key to youth and health–(kaiso no Eiyogaku –Wakasa to Kenko no Moto–)”, Seizamousyoten, Tokyo, Japan, 2007, pp. 20–53.
2) Y. Kawamura; “New–Nori book Basics (Shin–nori Bukku Kisohen)”, Nori Sangyo Joho Center, Fukuoka, Japan, 2017, p.142.
3) H. Noda, S. Iwata; “New Story–Nori product improvement guide (Sinpen–NoriSeihin Kojyo no Tebiki)”, Zenkoku Norikairui Gyogyo Kyoudoukumiai Rengoukai, Tokyo, Japan, 1983, pp. 24–28.
4) Y. Yoshie, K. Suzuki, T. Shirai, T. Hirano; “Free amino acids and fatty acid composition in dried nori of various culture locations and prices” (in Japanese). Nippon Suisan Gakkaishi, 59, 1769–1775 (1993).
5) R. Takahashi, K. Nishinari; “Analysis of deliciousness (Oisisa no Bunsekii)” (in Japanese). Bunseki, 8, 388–394 (2010).
6) K. Ito; “Free amino acids and peptides in marine algae” (in Japanese). Nippon Suisan Gakkaishi, 35, 116–129 (1969).
7) H. Amano; “Marine Biochemistry (Suisanseibutukagakukai)”, Tokyo Daigaku Syuppankai, Tokyo, Japan, 2000, pp. 170–212.
8) S. Araki, Y. Izumino, T. Sakurai, K. Takahashi; “Taste evaluation of toasted Nori, Porphyra yezoensis, a red alga by warm water–extract” (in Japanese), Nippon shokuhin kagaku kou-gaku kaishi, 44, 430–437 (1997).
9) Y. Kawamura, M. Washio; “Simple method for extracting free amino acids from dried and fresh Nori” (in Japanese). Bulletin of Saga Prefectural Ariake Fisheries Research and Development Center, 18, 1–5 (1998).
10) Y. Fujii; “Studies on the nucleotides and their related substances in dried laver” (in Japanese). Nippon Suisan Gakkaishi, 33, 453–461 (1967).
11) S. Araki, T. Sakurai, Y. Izumino, K. Takahashi; “5’–Inosinic acid content and its enzymatic increase in dried nori, Porphyra yezoensis, a red alga” (in Japanese). Nippon
Taste-active Components of Dried Nori

shokuhin kagaku kougaku kaishi, 43, 956-961 (1996).

12) H. Noda, Y. Horiguchi, S. Araki; "Studies on flavor substances of ‘Nori’, the dried laver Porphyra spp.–II Free amino acids and 5’-Nucleotides". Bull. Japan. Soc. Sci. Fish., 41, 1299–1303 (1975).

13) T. Tashiro, E. Fujita, C. Yasunaga; "Analysis of nucleic acid related substances of dried purple laver" (in Japanese). Nippon Suisan Gakkaishi, 49, 1121–1125 (1983).

14) T. Tashiro, E. Fujita, M. Tamai, J. Higashi; "High-performance liquid chromatographic determination of 5’-and 2’(3’)-mononucleotides in seaweeds and fishes (Analysis of Nucleic Acid Related Substances by Ion-Exchange Chromatography Part VII)” (in Japanese). Nippon Shokuhin Kogyo Gakkaishi, 38, 1–6 (1991).

15) S. Nakamura, H. Akagawa, T. Ikawa, H. Kawanobe; “Separation and identification of nucleotides in some seaweeds” (in Japanese). Bot. Mag., 81, 556–565 (1968).

16) Yeung-Ho PARK, C. Koizumi, J. Nonaka; “Effect of a humid atmosphere upon the chemical constitution of “Nori” – II composition of organic acids” (in Japanese). Nippon Suisan Gakkaishi, 39, 1051–1054 (1973).

17) Yeung-Ho PARK, C. Koizumi, J. Nonaka; “Effect of a humid atmosphere upon the chemical constitution of “Nori” – III sugars and some other components” (in Japanese). Nippon Suisan Gakkaishi, 39, 1163–1167 (1973).

18) T. Fujita; “About Umami components of Nori (Nori no Umamiseibun nituite)”, Noritaimusu, 1640, Chiba, Japan, (2000)

19) J. Konosu; “Taste of fish and shellfish with special reference to taste-producing substances” (in Japanese). Jpn. J. Food Eng., 20, 432–439 (1973).

20) T. Take; "Studies on taste components in various foods (Kakusyu Syokuhin tyuno Teimiseibun ni Kansuru Kenkyuu)”. Science of Cookery, 2, 231–237 (1969).

21) Y. Hashimoto; “Taste of marine products (Suisanbutsu no Aji)”. Science of Cookery, 5, 2–7 (1972).

22) T. Take, R. Honda, H. Otsuka; “Studies on the tasty substances of various foods (Part 2) on the tasty substances of prawn and shrimp” (in Japanese). Nutrition and Food, 17, 268–274 (1964).

23) H. Furukawa; "(Oisisa wo Hakru Syokuhin Kannoukensa no Jissai)", SaiwaiShobo, Tokyo, Japan, 2012, p.140.

24) A. Kuninaka; "Studies on taste effect of nucleic acids related compounds (Kakusy Kanren Kagoubuto no Teimisayon ni Kansuru kenkyuu)”, Nippon Nogeikagaku kaishi, 34, 489–492 (1960).

25) Y. Komata; “Studies on the extractives of “Uni”–IV. Taste of each component in the extractives” (in Japanese). Nippon Suisan Gakkaishi, 30, 749–756 (1964).

26) T. Hayashi, H. Furukawa, K. Yamaguchi, S. Konosu; “Comparison of taste between natural and synthetic extracts of snow crab meat”. Bull. Japan. Soc. Sci. Fish., 47, 529–534 (1981).

27) K. Watanabe, Huai-Ling LAN, K. Yamaguchi, S. Konosu; "Role of extractive components of scallop in its characteristic taste development (Taste-active components of scallop part II)” (in Japanese). Nippon Shokuhin Kogyo Gakkaishi, 37, 439–445 (1990).

28) Kawai M, Okiyama A, Ueda Y; “Taste enhancements between various amino acids and IMP”. Chem. Senses., 27, 739–745 (2002).

29) M. Kawai; “Chat of bioengineering – from basic principle of experiment to application (Seibutukougaku Yomoyamabanashi – Jikkenn no Kihonnengennri kara Oyo made–), Gakushinsyuppann, Yokohama, Japan, 2013, p.80–89.

30) M. Suyama, S. Kounosu; “Marine Food Science (Suisan Syokuhingaku), Kouseisya Kouseikaku, Tokyo, Japan, 1987, pp. 71–94.

31) A. Aono, R. Sakaguchi-Yokoyama; "Production of guanylic acid by cooking of tomato" (in Japanese). Nippon shokuhin kagaku kougaku kaishi, 62, 417–421 (2015).

32) H. Horie; "Analysis for the taste compounds in various vegetables by capillary electrophoresis” (in Japanese). Bunseki Kagaku, 58, 1063–1066 (2009).

33) K. Iwano, K. Takahashi, T. ito, N. Nakazawa; “Search for amino acids affecting the taste of Japanese sake” (in Japanese). J. Brew. Soc. Japan, 99, 659–664 (2004).
板のりの呈味有効成分の同定と役割

川島時英†, 白井隆明, 松田寛子†, 大迫一史, 岡崎恵美子
1千葉県水産総合研究センター, 2東京海洋大学大学院

板のりの商品価値は, 一般に, 色・つや・形・香りが良いものとされ, 味や栄養成分は商品価値の指標とはなっていない。しかし、近年は、タンパク質含量の高い板のりが美味しい海苔として商品化されている。板のりの呈味成分は遊離アミノ酸などが調べられているが、板のりの呈味を構成している成分の同定や役割は調べられていない。そこで、官能評価により板のりの呈味有効成分とその役割を明らかにした。

官能評価は、選定テストにより選ばれた20代から50代の男性3名、女性4名の合計7名で実施した。官能評価の方法は、始めに各成分の板のりの味への寄与について確認するために、各合成エキスの味の識別テストを、3点識別試験法を用い、有意差の有無を判定した。次に、選び出した試料が他の2つの試料に比べて、甘味、酸味、塩味、苦味、うま味の5種の基本味に濃厚感を加えた5項目についてどのように感じたかを評点法により評価した。

板のりの呈味有効成分は遊離アミノ酸のAla, Glu, Asp, ほかにTau, ATP関連物質のIMPの5成分を同定した。また、板のりの呈味はうま味が主体で、うま味の強さは分析結果や官能評価とも一致した。板のりのもつうま味は主として、GluとIMPの相乗効果によると想定され、Alaは甘味、塩味、濃厚感、Gluは塩味、うま味、濃厚感、Aspは塩味、うま味、濃厚感、Tauは酸味、IMPはうま味、濃厚感に寄与していることが明らかとなった。