

Taste component analysis of Pacific oysters cultured in Konagai, Nagasaki and taste evaluation using a taste-sensing system

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Abstract

We analyzed the chemical constituents of Pacific oysters (*Crassostrea gigas*) collected in the Konagai district in Nagasaki Prefecture and further evaluated the taste characteristics using a taste-sensing system. We compared the results with those obtained for oysters collected in Hiroshima Prefecture, which are most widely distributed oysters in Japan. We analyzed the taste components, including free amino acids, adenosine triphosphate (ATP) and related compounds, and glycogen contents, in the oysters by means of spectroscopy and high-performance liquid chromatography (HPLC). The levels of serine, alanine, and β -alanine, which are free amino acids that confer sweetness, were significantly higher in oysters cultured in Konagai than those cultured in Hiroshima. Glutamic acid levels were not significantly different between oysters from the two districts. Oysters in Konagai contained significantly lower levels of aspartic acid, which is associated with a slight umami taste, than those in Hiroshima. The levels of valine, methionine, isoleucine, leucine, and phenylalanine, which are associated with bitterness, were significantly lower in oysters from Konagai than in those from Hiroshima, although the overall proportion of these amino acids among the total free amino acids was low. No significant difference in total free amino acid levels and glycogen levels was observed between the oysters cultured in the two districts. With regard to ATP and its related compounds, adenosine mono-phosphate (AMP) levels were shown to be significantly higher in oysters from Konagai than in those from Hiroshima. The results of the taste sensor analysis showed significantly higher values of umami and astringency, with significantly lower values of aftertaste of bitterness, in Konagai samples than in Hiroshima samples. The umami taste, which is primarily derived from glutamic acid, is known to be enhanced by the synergic effect of inosine mono-phosphate (IMP) and AMP, which is structurally similar to IMP. Thus, the taste sensor used in this study might reflect the umami taste enhanced by the synergic effects on the human tongue. These findings indicate that the oysters collected in Konagai might have a stronger sweet, astringent, and umami taste and a weaker aftertaste of bitterness than those from Hiroshima. The results of the taste sensor analysis did not contradict with those of the chemical analysis. The use of a taste-sensing system to evaluate the taste of raw oysters may serve as a potential alternative to the conventional evaluation of heated oysters that are deemed more hygienic.

Keywords : Pacific oyster, taste components, free amino acids, ATP-related compounds, taste-sensing system

I Introduction

In 2014, the total production of oysters (with shell) in Japan was 184,100 t, and Nagasaki Prefecture ranked 11th in

production in the country, contributing 1,100 t of oysters¹⁾. The oysters in Nagasaki, which is not well-known as an oyster-production region, account for a small market share; however, the oysters produced (single seed without conventional

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