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Comparison of free amino acid components in the Pacific oyster reared using two different culture methods in Nagasaki prefecture

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Abstract

The Pacific oyster was cultured off the coast of Konagai along Isahaya Bay, Nagasaki Prefecture using the conventional suspension method (CSM) and the single seed method (SSM). By using the SSM, oysters were said to have good appearance and taste better than those by CSM, although no comparison report was found on free amino acid constituents affecting the taste between the two different culture methods of CSM and SSM. We investigated the taste-associated free amino acids of the oysters obtained from the same district in December 2012 and March 2013 and cultured using either of the two methods. Besides, we made another comparison of the free amino acid constituents between the two collection periods of winter and spring. Consequently, we observed that the mean total levels of amino acids in oysters from both collection periods was higher in oysters cultured using the SSM than in those using the CSM. Especially in December 2012, we found that the mean total level of free amino acids was significantly higher in the SSM-cultured oysters by ca. 36% than in the CSM-cultured oysters. The level of glutamic acid, related to umami, was significantly higher in oysters cultured using the SSM than the CSM by ca. 70% and 81% in December 2012 and March 2013, respectively. At both collection periods, serine, glycine, alanine, and β-alanine, which were related to sweetness, showed higher levels in the oysters cultured using the SSM than the CSM. Especially in December 2012, the levels of threonine, serine, alanine, and β-alanine were significantly higher in the SSM-cultured oysters than in the CSM-cultured oysters by ca. 139%, 167%, 78% and 81%, respectively. In March 2013, the levels of glycine and β-alanine were significantly higher by ca. 26% and 32%, respectively. These findings exhibited the SSM-cultured oyster had stronger tastes in umami and sweetness than the CSM-cultured oyster. On the other hand, oysters obtained in March showed higher level of total free amino acid and contained more free amino acids related to umami and sweet tastes than those in December during the same harvest season in Konagai. Accordingly, the results correspond to the feedback of consumers that the oyster cultured using SSM tastes better than that using CSM, and further, that the spring oyster tastes better and richer than the winter oyster, which might be due to the abundance of amino acids that impart the sweet and umami tastes.

Keywords : Pacific oyster, free amino acids, culture, single seed, taste components

I Introduction

In Japan, the Pacific oyster is conventionally cultured using the suspension method where oysters are cultured on scallop shells suspended in the sea[1-3]. This method results in the deformation of the adult oyster shells due to congestion of the growing larvae. On the other hand, in the single seed method[4] (SSM), oyster spats are attached to and grown on granules of fractured oyster shells in hatcheries and cultured in mesh baskets suspended in the sea. Recently, Ohashi[5] developed another SSM wherein oyster larvae are allowed to be settled on the plastic plates, the small oysters are grown to an appropriate size and detached, placed in a mesh basket, replaced repeatedly in another mesh basket according to size, and cultured until the harvest season.[6, 7] The shells of oysters thus cultured by the SSM become round-shaped, have good looking for eating

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