

Study on Mechanism and Identification of Taste Improvement Compounds of Red Algae by Salt Stress

Yuya Kumagai, Hideki Kishimura, Chikara Kawagoe

Faculty of Fisheries Science, Hokkaido University

Summary

Seaweed is considered to be one of the sustainable resources for future food shortages. Red algae dulse is mainly distributed in the cold waters along the coast of Hokkaido. Hokkaido dulse contains useful ingredients for human health such as abundant phycoerythrin and lutein. In addition, it also contains the growth effect of oligosaccharides on *Bifidobacterium* sp., bioactive peptides with antihypertensive and antioxidant activity, unsaturated fatty acids such as EPA, vitamins, and minerals. Therefore, Hokkaido dulse has been revealed a new regional resource containing useful ingredients. Dulse is a familiar food in Irish and Canadian, but not in Japanese.

For the potential of dulse as a food, we attempted to improve the taste by salt stress and elucidated the genes involved in starch synthesis and osmotic pressure regulation compounds. The amount of floridian starch in the salt-treated sample increased 2.2 times compared to the control sample. In addition, the total amount of amino acids in the dry weight increased 1.3 times in the salt-treated sample. Among them, the increase in aspartic acid (asparagine + aspartic acid) accounted for nearly 20% of the total. Branched-chain amino acids, which are the main raw materials for muscle proteins, and sulfur-containing amino acids, which have the effect of improving lipid metabolism, increased 1.3-fold and 2.2-fold in salt-treated samples, respectively. In addition, the amount of free amino acids increased 1.2 times in the salt-treated sample. The amounts of umami-related amino acids, glutamic acid and aspartic acid, increased 1.1-fold in the salt-treated sample. Comparing the amount of free amino acids in Nori and salt-treated dulse, Nori contains about 1,000 mg/100 g of glutamic acid and alanine, whereas dulse contained 220 mg/100 g and 125 mg/100 g, respectively. Water-soluble small molecules such as floridoside, trehalose, and sucrose are thought as osmolyte. Dulse genome contained the genes involved in the starch synthesis in chloroplast and cytoplasmic, osmolyte productions floridoside, trehalose, and sucrose. Among them, it was found that the main osmolyte in dulse was floridoside.