No. 2238

Effects of High-Salt Conditions on Fermenting Microorganisms in High-Salt Fermented Foods

Tomoo Ogata

Maebashi Institute of Technology

Summary

Miso and soy sauce are fermented foods that are fermented under conditions where a large amount of salt is added to the food ingredients. *Zygosaccharomyces* sp. yeast, a salt-tolerant microorganism, is the main fermenting microorganism. Since most of the yeast strains used for the production of miso and soy sauce seeds are natural hybrids between *Z. rouxii* and related species, natural hybrids are hereinafter referred to as *Zygosaccharomyces* sp. yeast. Sufficient consideration has not been given to the effects of high-salt conditions on fermenting microorganisms and their effects on the quality of fermented foods.

HEMF (4-Hydroxyl-2(or 5-)-ethyl-5(or 2)-methyl--3(2H)-furanone) is a food aroma component produced by *Zygosaccharomyces* sp. yeast, and has a profound effect on the quality of fermented foods. We investigated how high-salt conditions affect the production of HEMF. As a result, *Zygosaccharomyces* sp. yeast NBRC1876 significantly increased HEMF production under high salt conditions. On the other hand, *Zygosaccharomyces* sp. yeast NBRC1877 *ura3Δ* tended to increase HEMF production under high salt conditions, but the difference was not significant. It was suggested that genetic factors that increase the production of food aroma HEMF under high-salt conditions may exist in miso-soy sauce yeast *Zygosaccharomyces* sp. NBRC1876.

We have sequenced the genome of *Zygosaccharomyces* sp. yeast NBRC1877, which had not been sequenced until now. Chromosomes consisting of the T subgenome sequence, which are almost identical to the sequence of *Z. rouxii* CBS732, and chromosomes consisting of the P subgenome sequence, which are a sequence derived from *Z. rouxii* related speices, were almost aligned. It was presumed that some chromosomal sequences were deleted when compared with previously whole-genome-sequenced yeast strains.

We have found that the mating of *Zygosaccharomyces* sp. yeast, the main fermenting microorganism for miso soy sauce, is increased under high salt conditions. Mating affects the genetic stability of yeast. Therefore, with the aim of obtaining biological knowledge that contributes to the production of higher-quality fermented foods with a high salt content, we investigated the expression of genes involved in mating expression in *Zygosaccharomyces* sp. yeast under high-salt conditions. Both the *STE6* gene, which is a mating type a-specific gene, and the *STE3* gene, which is a mating type alpha-specific gene, were upregulated under high salt conditions. This result was consistent with our previous report that mating frequency increased under high salt conditions.