

Study in the Population of Halophilic Bacteria in "Suku-garasu" (Salted Fries of *Siganus fuscens*) Made in Okinawa

Takashi Kuda

Ishikawa Agricultural College

Summary

Fries (length of about 2-4 cm) of *Siganus fuscens*, called "suku" in Okinawa (in the subtropical zone), are brought near the shores of each island during the first days of June and July of the lunar calendar. Fisheries add salt of from 25 to 50 % of the fish weight immediately after catching and the "suku" is placed in a bottle or a jar. Then it is fermented for several months or longer. This traditional salt product is called "suku-garasu" (SG) in Okinawa. On the other hand, the uncooked, salted and fermented fish are manufactured traditionally also in the Noto Peninsula, Ishikawa Prefecture, facing the middle of the Sea of Japan (in the temperate zone). It is salted for several months until it becomes red. It is made of squid or mackerel, and salt only. In this study, to determine the existence and populations of halophilic bacteria in the salted fish products, the bacterial number of the products was enumerated using the plate agars containing 0 to 20 % (w/v) NaCl. The effects of NaCl concentration and temperature on the growth of five strains were isolated from SG. Salted squid and salted mackerel were also determined to consider the relationship between the characterization of predominant bacteria and the salinity in the foods, manufacturing location areas, or kinds of raw materials.

The number of halophilic bacteria and their chemical compounds in SG and other salted and fermented fish products made by traditional methods in Japan differed by kinds of fish, methods of manufacture, factories, and NaCl concentrations. In four of five SG containing from 21.1 to 27.8 % (w/v) NaCl, the bacterial number was only 10^3 cfu/g or lower. For the other SG containing 16.0 % NaCl, there were 10^7 cfu/g of halophilic lactococci with high levels of lactic acid and water-soluble proteins, free amino acids and volatile basic nitrogen. In salted mackerel, the number of halophilic lactococci was 10^5 cfu/g, which was higher than that in salted squid. Two salted mackerel samples that contained from 22.3 to 24.0 % NaCl had a high level of lactic acid. However, the lactic acid concentration was very low in the samples of salted mackerel containing 27.9 % NaCl. Furthermore, although the predominant genus in the well-fermented products was *Tetragenococcus*, a moderately halophilic lactococcus, the reactions of the isolates to NaCl concentrations, temperature and carbohydrates were variable. We consider the results to be very appropriate as to the quality of the products.