

Fermented Soybean Foods in Daily Life



Soybeans contain large quantities of proteins and lipids, rendering them so nutritious that they are sometimes referred to in Japan as the “meat of the fields.” Originally a crop that preferred cool climates, soybeans were at first grown only in China, Japan and other parts of Asia; today they are successfully cultivated in the United States and in tropical climates as well, including South America and Africa.

In Japan, soybeans play a key role in the daily diet. They appear on the table in the form of typical fermented foods, such as *shoyu*, *miso* and *natto* (fermented soybeans); and are enjoyed in popular processed foods such as tofu, *abura-age* (fried tofu), soymilk and *nimame* (cooked soybeans). At their simplest, succulent young soybeans are simply

boiled, salted and eaten as *edamame*.

A new look at the nutritional value of soybeans has revealed that the proteins they contain are the equivalent of animal proteins. Scientific research has begun to demonstrate that soybeans are endowed with properties that may prevent cancer, some life-style related diseases, and certain chronic conditions. It has also been discovered that the fermentation of soybeans produces certain constituents within the beans that are beneficial to the health.

The diverse climates within the Japanese archipelago are reflected in the various foods created by using fermented soybeans: the fermented products of each region carry their own distinctive flavors. Dishes such as *tempeh*, *kinema* and *jiang* are just a few examples of the wide variety of fermented

soybean foods found throughout Asia – a clear sign that the versatile soybean may be considered the starting point in the exploration of Asia’s dietary culture.

Today, however, fermented soybean foods are no longer considered strictly categorized within either the Japanese or Asian food cultures – this traditional foodstuff of the Orient has now been recognized worldwide as essential to any healthy diet. Here we present a picture of these foods: their history, characteristics and how they are prepared.



Shoyu (Soy Sauce)

Kikkoman Institute for International Food Culture

The *kanji* character combination now used for the word *shoyu* (soy sauce) is said to have first appeared in Japan during the mid-Muromachi period (1336-1573). The method for making Japanese *shoyu* was not established, however, until the early Edo period (1603-1867), and it was not until the late Edo period that the method was perfected using its present ingredients (soybeans and wheat).

An important part of the *shoyu* manufacturing process is making the *koji*. *Koji* is a fermenting agent made by breeding *koji*-mold on steamed grains, such as rice, and is an essential ingredient in the production of fermented foods. *Koji* has played an important role in developing certain unique aspects of Japanese culinary culture. Many of this country’s traditional fermented foods, such as *shoyu*, *miso* (soybean paste), sake, *shochu* (a distilled spirit), *mirin* (sweet cooking sake), *amazake* (a sweet beverage made from rice *koji*), rice vinegar, some varieties of *tsukemono* (pickles), and *sakamanzu* (sake flavored dumplings), are made using *koji*. In other words, it is impossible to discuss traditional



Source: *Shimousa shoyu jozo-no-zu*, in the *Dainihon-bussan-zue*
Property of Kikkoman Corporation

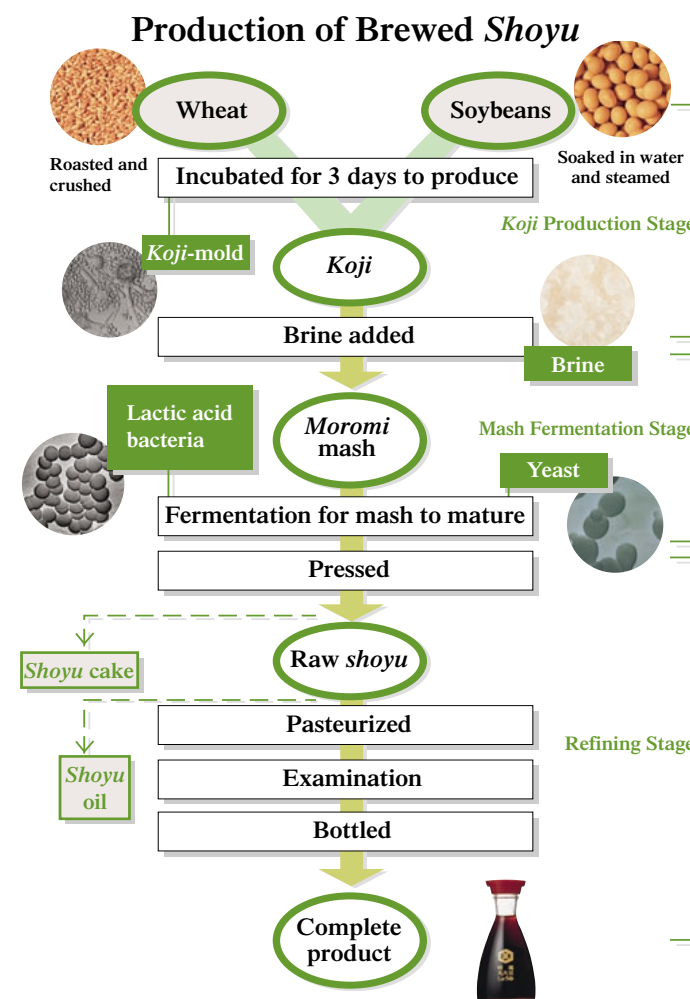
Japanese culinary culture without mentioning *koji*.

Koji-mold actively produces enzymes that decompose protein and starch. It is used as *shoyu-koji* (*koji*-mold culture), which is made by mixing steamed soybeans and roasted wheat, and then adding *tane-koji* (a seed starter of *koji*-mold). Salt water is added to this *shoyu-koji* to make *moromi* (mash). In *moromi* protein

in the soybeans is decomposed into amino acids and the sugar in the wheat mainly into glucose. Also in *moromi*, salt-tolerant lactic acid bacteria induces latic fermentation, which produces lactic acid. Next, salt-tolerant yeast induces alcoholic fermentation, giving rise to over 300 different aromatic compounds. As the *moromi* matures, the amino acids and sugar compounds in the *moromi* slowly give it a brownish color.

Finally, the mixture is heated to sterilize it and adjust the color, a process that also gives it a magnificent roasted fragrance, or *higa*. The finished *shoyu* incorporates a variety of aromas, including vanillin (the main ingredient in vanilla essence), a pleasant smoked fragrance similar to that found in whisky and coffee, and an almost brandy-like fragrance. *Shoyu* is also laden with flowery and fruity aromas, and its spiciness gives it an international appeal. As a result, *shoyu* goes extremely well with meat. It is often referred to as an all-purpose fermented seasoning, as it incorporates the five basic tastes of sweetness, saltiness, sourness, bitterness, and *umami*. In fact, the popularity of traditional Edo period dishes, such as tempura, *soba* or *udon* noodles, *kabayaki* (broiled eel), *tsukudani* (food simmered in *shoyu*), and sushi, can be partly attributed to the development of quality *shoyu*. *Shoyu* is also the main seasoning in various modern Japanese dishes, such as *sukiyaki* and *yakitori* (grilled skewered chicken). *Shoyu* has played an important role in Japanese cuisine, including such daily dishes as simmered vegetables, beans, and yams, as well as other foods, such as pickles.

Today, *shoyu* can be found in powdered and granulated forms in addition to the traditional liquid



type. Powdered *shoyu* and *shoyu* in granulated form are used in instant soups, ground seasonings, frozen foods, sweets, processed meat products, and liquid seasonings.

Japanese *shoyu* was exported to Europe through international trade between the Netherlands and Nagasaki (see *compra* bottle below). There is a section dedicated to *shoyu* in the *Encyclopédie* edited by the renowned French philosopher Denis Diderot in 1772, in which the superior qualities of Japanese *shoyu* are introduced.

Japanese *shoyu* has developed from a symbol of cultural exchange to one of cultural fusion. It is now used in a wide variety of dishes such as pizza, teriyaki

salmon, steak with *shoyu*-based sauce, salad dressing and meatloaf. No doubt it will continue to be used in different forms of cooking all over the world.

Text by Mitsutoshi Hamano



Powdered *shoyu*: Used in processed foods, such as soups for instant *ramen* noodles.



Sushi



Sukiyaki



Seaweed salad



Japanese stingfish
cooked in *shoyu*



Potatoes, green beans
and beef simmered in
shoyu



Compr Bottles

Used from the late Edo period until the beginning of the Meiji period as a container for exporting *shoyu* from Nagasaki to the Netherlands.

Casks

Used from the Edo period until the high economic growth period after World War II.



Cans

Used since the Taisho period (1912-1926) to present day. (The particular type photographed is not in use today.)

Glass Bottles

Used since the Taisho period to present day.



PET Bottles

Used for the first time in the Japanese food industry in 1977 by Kikkoman and in many different ways since then.



References

- Yokotsuka, T. and Sasaki, M. "Fermented Protein Foods in the Orient: *Shoyu* and *Miso* in Japan." *Microbiology of Fermented Foods*. Ed. Brian J.B. Wood. Blackie Academic & Professional, 1985. 351-415.
- Fukushima, Danji. "Industrialization of Fermented Soy Sauce Production Centering around Japanese *Shoyu*." *Industrialization of Indigenous Fermented Foods*. Ed. K.H. Steinkraus. Marcel Dekker, Inc., 1989. 1-88.
- Hamano, Mitsutoshi. "Water Activity and Water Behavior of Soy Sauce, Dehydrated Soy Sauce and the Improvement on Hygroscopicity of Dehydrated Soy Sauce." *Developments in Food Engineering—Proceedings of the 6th International Congress on Engineering and Food*. Ed. T. Yano. Blackie Academic & Professional, 1994. 179-181.