

# 琉球大学学術リポジトリ

## 沖縄の伝統食文化である木灰ソバの歴史と製造に関する研究

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# Research on the History and Production of Lye-kneaded Wheat Noodle as Part of Okinawan Traditional Food Culture

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**Key words** : Lye-kneaded Wheat Noodle, Okinawan Noodle, Food Culture of Okinawa

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## Summary

In this article, the author considers the meaning of lye-kneaded wheat noodles as part of Okinawan traditional food culture from the viewpoints of history and production. Currently, lye-kneaded wheat noodles have been found in three places; one is in Lanzhou, Gansu, China, another in Chiang Mai, Thailand and the other in Okinawa. Regarding their introduction to Ryukyu, there seem to be two main theories; one is based upon the arrival of the "36 clans of Kume" from China in the late 14<sup>th</sup> century and the other upon the visit of "sapposhi" to Ryukyu from China (1372). It may be after the Meiji era that the lye-kneaded wheat noodles became popular among the ordinary people. The kinds of tree used for lye-making before World War II were *Bischofia javanica*, *Podocarpus macrophyllus*, *Ficus microcarpa*, *Casuarina equisetifolia*, and *Murraya paniculata*. At present, mainly *Ficus microcarpa*, *Schima wallichii*, *Castanopsis sieboldii*, and *Casuarina equisetifolia* are used. Lye-kneaded wheat noodles are prepared by kneading wheat flour with lye that is obtained from natural wood ashes. For ordinary Okinawa Soba, artificially carbonated water is used. In natural lye, other than major components such as potassium and sodium, many trace components are contained as well. These mineral elements are essential to maintain the health of human beings. Based upon experimental results, suitable pH levels and Baume degrees for soba-making with natural lye were approximately 12–13 and 2–3, respectively. Another look should be taken at the lye-kneaded wheat noodles made with natural lye as health food which fosters a variety of tastes and is part of food culture in noodles and valuable enough to be passed on to future generations.

## Introduction

In Okinawa, there is a lye-kneaded noodle, which is made by kneading wheat with the lye of wood ash besides the ordinary Okinawa Soba (Okinawa Noodle). The lye-kneaded

noodle was commonly produced during a certain period before and after World War II. Owing to the health food boom these days, another look at the lye-kneaded noodle has been taken, so that shops which produce it have been increasing.

Production of noodles by using wood ash has been found in two places outside Japan; one is in Lanzhou, Gansu, China and the other in Chiang Mai, Thailand. At present, in Japan it can be seen only in Okinawa.

Making noodles with wood ash has been a traditional method in Okinawa for a long time. When firewood was used to cook, lye was made from the ashes in an oven and homemade lye-kneaded noodles were made in an ordinary family.

Today, artificially carbonated water is exclusively used for Okinawa Soba. Noodles made by using the lye of natural wood and those made with artificially carbonated water have delicate differences in ingredients and taste.

Regarding the history of Okinawan lye-kneaded noodles, there are reports by Yokuta (1982) and the Okinawa Times (1996). Tamura (1991) clarified quality characteristics of the exclusive carbonated water used for lye-kneaded noodles through physical and chemical properties. Regarding the production and quality of lye-kneaded noodles in Soba shops in Okinawa prefecture, there is an investigative research by Nakama and Kodama (2001).

What is the meaning of the lye-kneaded noodle in the present food culture regarding noodles? There seems to be no example that explains the value and the position in the food culture. In this short thesis based upon the results of research on its history and production, it is considered why the lye-kneaded noodle is spotlighted now and what the meaning is.

## 1. Culture of Eating Ashes

In the Bible, more than 20 references to ashes are given. In Psalm 102: 9, regarding ashes, it is written, "For I have eaten ashes like bread, and mingled my drink with

weeping.” We don't know how they ate ashes, but based upon the description, the culture of eating ashes seems very old.

In the oldest Chinese agricultural book, *Seimin Yojutsu* (AD 530–550), it is written that millet dumplings were wrapped by leaves of *Zizania latifolia*, boiled in thick lye, and eaten on May 5 and the summer solstice. This is now called “Akumaki,” which is part of food culture about lye introduced in Japan.

In Japan, lye has been used widely for such as removing the bitter taste from bracken, sterilizing the cut ends of seed potatoes, an antiseptic agent for the meat of pheasants and hares, a preservative for dry wakame seaweeds, an inhibitor of various bacteria for Japanese rice wines and so on. Through experience, it has been found that if raw chestnuts, barn grass rice cakes, potatoes, sweet potatoes, eggplants, etc. are heated up in ash slowly, sugar increases, so that these may taste better. Kunio Yanagida wrote that ashes were probably used mainly to cook rice, the principal food for the Japanese, in ancient times.

The preparation method for eggs pickled in ash paste (Pi Dan) and served as an appetizer in Chinese cuisine is unique. Salt, lime, and the ashes of trees and plants are mixed together with water and soil and kneaded into dough, which is slathered on to duck eggs with approximately one-centimeter thickness. After being sealed and kept in an earthenware pot for three to six months, the eggs are ready to be served. The preparation of ash-paste-pickled eggs is introduced in “Culture of Ashes” (1984) by Takeo Koizumi as an example of food, where proteins are denatured by alkali, with a peculiar glutinous and chewy taste.

When did the unique technique to prepare noodles by kneading in the lye of wood ash wood begin?

Okumura (1996) mentioned that there seemed to be something like noodles in China three thousand years ago; he mentioned that noodles originated in the areas of Taiyuan and Taedong in Shanxi. It is said that in the Tang period (in the beginning of the Nara era in Japan), almost all the noodles, which exist now in China, appeared.

Even though the origin of the custom of preparing noodles by mixing the lye of wood ashes has not been clarified yet, it is certain that it has been related deeply to the tradition of the noodle in Chinese food culture lasting for thousands of years. Currently, noodle-making by using the lye of plants is found in Lanzhou, Gansu, China and Chiang Mai, Thailand

In cities of Lanzhou, Gansu, China, “mugwort ashes” are sold and Soba is made with the ashes. Probably it is only in Lanzhou that noodles made by using the ashes of plants are produced in China nowadays.

The “mugwort ashes” are made from “mugwort grasses.” These raw “mugwort grasses” are burnt in a hole and the rock-like lump of solidified dripping liquid is the so-called

“mugwort ash.” In Lanzhou, the “mugwort grass” is called “Peng Cao” and the solid “mugwort ash” is called “Peng Hui.” The “Peng Hui” seems to be pronounced “Feng Fai” in Northern Mandarin.

In Chiang Mai, Thailand, there seems to be noodle-making by lye but it is not sure what plant is used. Woody plants are used to make Okinawa Soba, as mentioned later. The soba made with the lye of woody plants is considered to be a rare example in the world.

## 2. Introduction of Lye Soba to Okinawa

When and from where was lye Okinawa Soba introduced and how was it firmly established in Okinawa. There still remains room for demonstrative research, but the summary of investigative reports to date is as follows. Regarding the root of Okinawa Soba, Miyagi (1996) put forward a theory of Chinese origin based upon similarities between Chinese noodles and Okinawa Soba. Further, he paid attention to Hakka as transmitters.

Hakka, who are descendents of the Han race that moved south from North China, have dispersed around the world and formed overseas Chinese societies abroad. It is said that they dispersed mainly from Fujian and Guangdong to the world. According to an oral investigation of Hakka in Guangdong conducted by Miyagi (1996), it is known that there was a technique of getting supernatant lye after dissolving wood ashes or straw ashes in water. In addition, it is mentioned that noodle-making by using the lye was carried out until quite recently in Hakka villages.

How was the technique of noodle-making with the use of lye introduced to Okinawa? In this respect, Miyagi (1996) assumed three routes mainly as follows.

The first route is the people who went to China as “shinkoshi” and “kanshou” during the Ryukyu Kingdom period. The “shinkoshi” were delegations to of subjects showing obedience by paying tribute to successive emperors of China. Sending delegations began in 1372 during the King Satto period and ended in 1874 (Meiji 4). For the period of approximately 500 years, it was performed almost once in two years (or once in five or ten years, depending on years). The “kanshou” were the students studying abroad sent by the Ryukyu Kingdom. The first assumption was built on the hypothesis that those people ate noodles in China and introduced the technique in Ryukyu.

The second route is the “sapposhi,” Chinese investiture missions, which visited Ryukyu to perform an imperial rank-awarding ceremony whenever a new tributary king ascended the throne. The rank-awarding relationship between China and Ryukyu lasted for 492 years from 1372 through 1866, and the ceremony was performed twenty-two times. The “sapposhi” visited Okinawa with cooks and remained for more than six months. The second assumption was built on the hypothesis that the cooks made lye soba and passed the technique on to the Ryukyuan.

The third is the route of a number of Chinese, later

known as the 36 clans of Kume, who began their establishment from Fujian, China, in Ryukyu from about 1392. The settlers got together and formed a Chinese village called Kume in Naha. There are a variety of views regarding when and why they came across the sea. The historical facts that they were engaged in preparing diplomatic documents, working as interpreters and functioning as instructors of navigation are clear. Miyagi (1996) considered that there were Hakka among the "36 clans of Kume," and assumed the transfer of the technique of lye noodle-making in this relation.

According to Miyagi (1996), cut noodles, prototypes of Okinawa Soba, can be seen in Quan Zhou and Fuzhou Cities in Fujian. Further, based upon documents, he took notice of "kona-yu," which was mentioned in written addresses to deities of "sapposhi," one of ceremonial tribute to the King of the Ryukyus and he assumed that the "kona-yu" was "something like soba in the soup and cooked in Ryukyu." It is said that the "kona" (powder) of the "kona-yu" indicates wheat flour in northern areas of China. This wheat flour was imported to Okinawa by cooks of "sapposhi" and became an ingredient for "kona-yu." Regarding the "kona-yu" confirmed in the oldest document, it appeared in a written address to deities as one of item of ceremonial tribute and was brought in when Chin Kan, a chief "sapposhi" delegate visited Ryukyu in 1534 (during the Jia Jing period). For this reason, Miyagi (1996) said, "The cut noodles existed in Okinawa in 1534."

Then, why was it not "men" (noodle) but "kona" (wheat flour)? In historical documents regarding the period of Kingdom of Ryukyu, the description of "so-men" (thin wheat noodles) can be seen but no historical supporting evidence that shows the root of Okinawa Soba has been found yet. Thus, further demonstrative research shall be implemented. However, it can be easily imagined through systematic descriptions to date that food culture in noodles was imported from China during the kingdom period of Ryukyu and firmly established.

Regarding the history of Okinawa Soba, there is another notable investigative report by Yokuta (1982). In this report, the history of Okinawa Soba after the Meiji era is described by focusing on interviews of elderly persons familiar with events of the past with some supplementary based upon documents.

According to Yokuta's investigation (1982), the opening of Soba shops took place in the middle of the Meiji era. The name of "soba" was "suba," "sina soba," (by Ryukyuan songs in the Meiji era), "sina suba" or "sina soba," which reminds us of the Chinese origin. Probably, calling it the name of "Okinawa Soba" was established firmly after World War II.

In this report, it is written that the "suba" before World War II was made with the lye of wood ashes. Further, the making of wood ashes and different kinds of lye has been investigated, as well. These will be mentioned

later.

Based upon the above mentioned, it could be assumed that even if the lye-kneaded wheat noodles could have existed during the kingdom of Ryukyu, they were food for the people of the samurai class and thus, not familiar to ordinary people. It may be after the Meiji era that the "suba" became one of the most popular foods among the ordinary people; the fact that lye-kneaded noodles already existed meant that the preparation technique had been already handed down, which can lead to assume that the technique can be traced back to the kingdom era before the Meiji era.

After classifying the data as mentioned above, what the lye-kneaded noodle is, how to make it and the present situation will be described as follows.

### 3. Kinds of Lye and Effects

In preparing lye-kneaded noodles, the property of the lye is very important because the quality of soba depends on it. The very first thing we have to do in order to make soba of quality is to select the kinds of wood from which good ashes are obtained and collect them. Generally, broadleaf trees could be more suitable than conifers. Among broadleaf trees, hard-wood trees would be better. For a long time, it has been said especially that conifers such as Japanese cedar and Ryukyu pine are not good for lye because of the smell of resin.

Currently, the main kinds of trees used for the lye are *Ficus microcarpa* (Moraceae), *Schima wallichii* ssp. *liukuensis* (Theaceae), *Castanopsis sieboldii* (Fagaceae), and *Casuarina equisetifolia* (Casuarinaceae), *Quercus miyagii* (Fagaceae) and *Eucalyptus globulus* (Myrtaceae). Before, *Hibiscus tiliaceus* (Malvaceae) was used as well. According to Yokuta's report, many kinds of ash such as those of *Bischofia javanica* (Euphorbiaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Ficus microcarpa*, *Casuarina equisetifolia* and *Murraya paniculata* (Rutaceae), as well as straw and wood ashes mixed together, and charcoal ash were given. It is mentioned that the charcoal ash especially had the best quality, so that the same amount of lye could be produced by half the amount of charcoal ash as of ordinary ash.

Tamura (1991) submitted an analytical report on inorganic components contained in the lye used mainly for Okinawan lye-kneaded noodles. The results of analysis are summarized in Table 1.

Based upon Table 1, we can see that lye contains many mineral components. The main mineral components that each tree contains are potassium and sodium. Relatively, calcium is contained more in *Distylium racemosum* and oak. The highest content of phosphorus can be seen in *Bischofia javanica* and bagasse. In other words, multiply, lye contains potassium and sodium as major components with other minor components such as calcium, iron, phosphorus and copper.

Table 1 Inorganic components contained in native Okinawan trees (Unit: mg/ℓ · Baume degree · pH value)

	Bischofia javanica	Ficus microcarpa	Castanopsis sieboldii	Hibiscus tiliaceus	Distylium racemosum	Quercus miyagii	Bagasse (Sugarcane)
Calcium	0.10	0.01	0.08	0.18	5.49	3.72	1.79
Copper	—	—	—	—	0.89	0.46	—
Iron	0.23	0.21	0.27	0.19	0.67	0.57	0.30
Potassium	7080	9400	8900	8500	8400	9200	10600
Magnesium	0.14	0.03	0.14	0.11	0.58	1.05	0.24
Manganese	—	—	—	—	—	0.19	—
Sodium	1750	600	1600	1300	440	660	70
Phosphorus	56.97	10.57	3.17	22.81	31.01	15.85	51.41
Baume deg.	2.0	2.0	2.0	2.0	1.4	2.0	2.0
pH value	12.9	13.4	13.5	13.0	11.4	12.0	10.7

Note) Tamura's data (1991) were updated. pH and Baume degree are adjusted values for a trial production of soba. The bagasse is the remainder of squeezed sugarcane.

In "Culture of Ashes," Takeo Koizumi described the effect of inorganic components (calcium, phosphorus, potassium, sodium, sulfur, magnesium, iron and chlorine contained in lye and other trace components (iodine, cobalt, copper, zinc and manganese) as follows.

Calcium forms human bones and teeth. It also becomes a neutralizer to keep bodily fluids slightly alkaline. Phosphorus combines with calcium to form calcium phosphate, which plays a leading role as adenosine triphosphoric acid to generate high energy in vivo. Potassium and sodium control minutely the alkaline equilibrium of bodily fluids and the osmotic pressure of cells. Sulfur forms sulfur-containing amino acids and becomes a component of vitamin B1, biotin, bile acid, chondroitin sulfate, etc. Magnesium combines with phosphoric acid to become magnesium phosphate, which mostly exists in bones. But a small amount of magnesium phosphate becomes an activator for biosystem enzyme reaction. Sixty to seventy percent of iron is contained in red blood cells. Chlorine controls the osmotic pressure of cells and exists in gastric fluid. Iodine as a trace component functions to keep the thyroid gland normal. Cobalt is an important component of vitamin B12 that is related to anti-Addison anemia agent. Copper as well as iron is essential to form hemoglobin. Zinc has a very important relationship with pancreatic hormones. Manganese is essential to reactions producing biosystem energy.

As mentioned above, the lye of wood ashes contains a lot of natural minerals and trace components that are essential to maintain the life of man. These major minerals and minor components are blended together properly, so that the unique taste of lye-kneaded noodles can be created.

According to the investigation by Tamura (1991), potassium carbonate (80%), sodium carbonate (15%) and sodium (5%) of polyphosphoric acid, metaphosphoric acid, pyrophosphoric acid and phosphoric acid are contained in the powdered carbonated water of the Okinawa Raw Noodle Corporation. The components are artificially composed, which is quite different from components contained in naturally carbonated water

#### 4. Lye-making with Wood Ash

Four most important things in lye-making are the adjustment of lye, kneading, boiling and making of stock.

Among these, the adjustment of the lye is the most important factor that will specify the quality of lye-kneaded noodles.

There are some soba shops that have come up with various ideas for lye-making with wood ashes. According to the example of Izutsu-ya (opened in 1920, Taisho 9) in Okinawa prefecture before World War II based upon oral investigative survey by Yokuta (1982), the lye is prepared as follows. 36 liters of water and 18 liters of lye are mixed. Stir it ten times a day and leave it for one night as it is. This is the first lye. Another 18 liters of water is added to the first lye to obtain the second lye. As another example before World War II, although the proportion of water and lye was unknown in lye-making at Minshu Shokudo (opened in 1924, Taisho 13), the progress of lye was judged by licking and checking whether there was a taste that bit the tongue or not after adding salt and vinegar to the lye.

Through experimental results based upon the banyan tree, casuarinas and charcoal, Yagi(1993) made a full and detailed report that the best wood ash was the one obtained from banyan trees. He determined that when Baume relative densities of the lye of a banyan tree were 3 to 4, the viscoelasticity and taste of noodles was best. The lye at that time was prepared as follows. Add twice as much water as the banyan tree ashes and stir it. Leave it as it is for one night and day to obtain a clear supernatant liquid. As a measured result, the Baume relative density of the clear supernatant liquid was said to be 7 degrees. Adjust this lye with a relative density of 7 degrees so that it is 3 degrees, and then by adding salt, make it 9 degrees Baume relative density. He concluded that the lye-kneaded noodles made with the lye prepared in this way were best in quality.

Nakama and Kodama (2001) reported the lye-making technique at lye-kneaded noodle shops in Okinawa to be as follows. Case 1: Mix ashes and water in proportion of 4 to 5 parts water to 1 part ash in volume. Stir the

mixture, leave it for one night and filter the clear supernatant liquid with a cloth. Case 2: Mix 600 cc of ashes and 20 liters of water and boil the mixture. Leave it for one night and filter the clear supernatant liquid with a cloth. Case 3: Fill an earthenware pot up to 1/3 to 1/2 full with ashes of it and fill the rest up with water. Refill the pot with more ashes after using some of the lye in the pot. Prepare the first- to fourth-decocted lye in three to four containers to mix thin and thick lye. The concentration at that time is determined by rubbing two fingers to feel the degree of sliminess.

As mentioned above, there are various ways of lye-making such as those by deciding the proportion of water and ashes, by using senses and intuition through experience, etc.

Furthermore, it has been reported that the quality of lye-kneaded noodles was delicately affected by the kind of water used to dissolve wood ashes.

Yagi (1993) made suba according to respective quality of the water and clarified the difference in terms of color, appearance, consistency and taste. As samples of water quality, three different kinds - groundwater (246 ppm from A area and 188.5 ppm from B area), rainwater (18 ppm) and tap water (41 ppm) - were used. According to the data, the dough of lye-kneaded noodles made with hard water with high hardness like groundwater, was hard and it did not have much viscoelasticity or chewiness after being boiled. In the case of rainwater, the dough was hard and not tasty. Lastly, Yagi (1993) reported that the lye-kneaded noodles made with tap water had better viscoelasticity and taste.

Before World War II, well water and spring water was used by soba shops (Yokuta, 1982). Rainwater was given a wide berth because it was considered somehow to have an alkaline flavor easily. Many shops of lye-kneaded noodles have been using tap water filtered through softeners recently. Many of them are using tap water and some of them are using special tap water with amethyst, bakuan stone (a kind of mineral stone, healstone in English), bincho charcoal, etc. in it. There was only one soba shop that used rainwater (2001, Nakama).

Two main factors, which form properties of lye, are the pH value and Baume relative density. According to experimental results by Nakama and Kodama (2001), it has been confirmed that if the ratio of water to lye increases from the first-decocted water to the third-decocted water, the Baume density rather than the pH value decreases rapidly. Regarding the third-decocted water, when the mixing ratio of ash to water becomes 1 to 3, 4 or 5 respectively, the Baume degree becomes zero. However, the pH value stays at almost 12.

Using the pH value and Baume degree as indices, Nakama and Kodama (2001) carried out research on properties of lye at eight shops serving lye-kneaded noodles in Okinawa prefecture. According to the research results,

the values varied widely; pH values were between a maximum of 13.50 and a minimum of 9.05, and Baume densities were between a maximum of 4 and a minimum of 0. If the most suitable pH values known through experience are 12 to 13, five out of eight shops show good values and there were three shops out of the range. On the other hand, as the most suitable Baume value is 3, the values of all the shops were compared. As a result, only two out of eight shops had values between 3 and 4, the other six shops showed low values. Three shops showed Baume degree zero.

The main reason, why the Baume density value was generally low at each lye-kneaded noodle shop, seems to be due to the fact that the standard in terms of the mix ratio and frequency of lye decoction was not properly adhered to. Since valuable ashes were decocted many times, it was considered that the Baume degree decreased, which changed the quality of the lye for the worse.

The most suitable concentration of the lye for noodle-making has been said to be approximately 12–13 for pH and 3 for Baume degree with the water content about 50% in the kneaded-noodle dough. The properties of the lye have a great impact upon the quality of the kneaded noodles. When the concentration of lye is high, the color of lye-kneaded noodles is well developed but the viscoelasticity of the gluten becomes high, so that the noodles are easily break apart when boiled, and the smell of lye remains. If the density is low, the noodles have paler hues and the viscoelasticity becomes low, so that noodles without much chewy consistency are made. Thus, a suitable concentration of lye is needed for good noodle-making.

## 5. Examples of lye-kneaded noodles

Lye-kneaded noodles are made through the following sequential processes of the procurement of wood ashes, lye-making, mixing of wheat flour and lye (kneading), aging, flattening, cutting, boiling, covering with oil and cooling. A big difference from ordinary Okinawa Soba in noodle-making is that natural lye is being used. In addition, although Okinawan people call the lye-kneaded noodle "soba," buckwheat flour, which is used for soba (buckwheat noodles) in mainland Japan, is not used at all for Okinawa Soba.

Wheat flour can be roughly divided into three classifications: superfine flour, middle-power flour and thin-power flour. The wheat flour used for lye-kneaded noodles is a blend of superfine flour and thin-power flour. Generally, the superfine flour is used for bread, wrappings of jiaozi, Chinese noodles and Italian pizza and middle-power flour for udon (Japanese wheat noodles) and thin-power flour for cakes, biscuits, tempura, etc. For this reason, the taste of lye-kneaded noodles varies according to the kind of wheat used. The soba made with only superfine flour has the chewiness of hard noodles with

pale white color. The soba made only with thin-power flour has a soft chewiness with yellowish color which shows good color development.

According to the investigation carried out in October 2000, the number of soba shops making lye-kneaded noodles increased to 13. By individual region, there are 2 shops in Motobu Cho in the northern part of Okinawa Island, 1 shop in Ginowan City, 1 shop in Nishihara City, 1 shop in Nishihara Cho, 2 shops in Urasoe City, 1 shop in Haeburu Cho, 5 shops in Naha City and 1 shop in Ishigaki City. Most of them are gathered around Naha, Shuri and Urasoe located in the central and southern part of Okinawa Island.

How to make lye-kneaded noodles varies with each individual shop, as each has a peculiar way of kneading the noodles, deciding the fermentation time, flattening the noodles, making the stock, etc. For reference, examples of three shops are given as follows.

〈Case 1〉

Add one liter of lye to two liters of flour that are mixed in the proportion of 6 of superfine flour to 4 of thin-power flour, and knead it to have the dough, from which noodles for 5 or 6 people can be prepared. Sometimes, a little bit of salt may be added to the dough while kneading. Do not add all the lye at once but divide it and add it in at two or three different times to have it mixed evenly into the dough. Leave the dough as it is for approximately 30 minutes to 1 hour for fermentation. Roll the dough out evenly with a rolling pin sprinkling the separating powder (potato starch) on it and fold it into about five layers and cut. After cutting, unravel the noodles with the fingers. Boil them while unraveling. When the noodles float to the top, scoop them up into a bamboo colander. Spray sufficient salad oil on the noodles so that they do not stick to each other and cool them to avoid boiling them too much while unraveling.

〈Case 2〉

Add 6.3 kg of middle-power flour to 2300cc of lye with 240 g of salt and mix with a machine for two minutes. From the dough, noodles for 55 people can be prepared. Collect the dough sticking to the wall inside the machine, put it evenly in the machine, and then, mix for three minutes. Move it from the machine to a relatively big tub, cover it with a plastic sheet and step on to spread it with the feet washed cleanly with salt water. Cut it into 6 pieces equally, put them into bags and spread them with the feet into square plates. Leave them in a refrigerator for one night. Sprinkle tapioca powder on the dough, which is to prevent the balls of dough from sticking to each other and to prevent the boiled noodles from being sticky. While the noodles are being boiled, the tapioca powder dissolves into the hot water. Divide a sheet of dough into three pieces equally and flatten them with a machine twice. After flattening the second time, cut it again. Sprinkle tapioca powder on the pre-cut noodles,

leave them in a refrigerator for one night and boil just before eating.

〈Case 3〉

While adding lye of approximately 50% of wheat weight to the soba dough, knead the whole to the same consistency as an earlobe. Make a ball of kneaded dough and leave it as it is for an hour. Flatten the ball into a rectangular sheet with sufficient separating powder, fold it into 4 to 8 layers and cut it with a kitchen knife. Unravel the pre-cut noodles and give them a twist by hand. Pour much water into a cauldron, boil it, put the noodles into the cauldron while separating them and stir the noodles with chopsticks. Boil the noodles for about one minute. Drain the hot water from the noodles and spray them with salad oil to prevent the noodles from sticking to each other.

Soup stock of soba before World War II, according to Yokuta's oral investigation (1982), was made of ingredients such as dried bonito, pork on the bone, chicken meat, Ajinomoto, etc. The soup stock at an early stage had a deep color with the taste based upon soy sauce as a major ingredient and salt as a minor ingredient. It is said, however, that it later on became a light brown color with the taste of less soy sauce. Before World War II, probably some soba shops had a based on salt but most had a taste based on soy sauce.

For soup stock of soba shops today, ingredients such as pork on the bone, chicken meat, dried bonito, dried small sardine, special kelp for stock, etc. are used; each soba shop has its own unique taste and the taste has become rich.

## Conclusion

I have described the history of lye-kneaded noodles, the components and effects, impact of the quality of lye on lye-kneaded noodles and how to make lye-kneaded noodles, etc. so far.

These lye-kneaded noodles are a traditional part of food culture that could be traced back to the period of the Ryukyu Kingdom. Before and after World War II since the Meiji era, lye-kneaded noodles have been loved by everybody with their taste of the common people. Due to the difficulty of procuring lye with the decline of the use of the firewood after the war, noodle-making with lye was given a wide berth, and artificially carbonated water has been used mainly. However, since another look is being taken at traditional food culture, lye-kneaded noodles have been enjoying a revival recently.

If the lye-kneaded noodles are evaluated from today's viewpoint, they could be described in just a few words: "natural health food" born in the forest that has fostered a variety of tastes.

It is said that people of today are used to the taste lacking variety and people with disorders in the sense of

taste have been increasing. People with such a disorder would not be able to recognize a poison as a poison even when they swallow it due to the paralysis or degeneration of taste sensors. The situation they are now in is very dangerous for maintaining their lives.

We cannot tell the difference between lye-kneaded noodles and ordinary Okinawa Soba by looking at them. However, once you have become familiar with the taste of lye-kneaded noodles, you will be able to appreciate the unique taste, the chewy consistency. Once you have realized this and become used to it, you will see how monotonous the taste of ordinary Okinawa Soba is.

In the minerals contained in lye, there are many things essential to maintaining a human life. Especially, zinc, which is one of trace components of lye, keeps the sense of taste sharp and thus if we lack it, we might be taste-blind. Lye contains potassium and sodium as main components, and copper, iron and magnesium as trace components in good balance, which maintains our health in good condition with a multiplier effect and moreover these, minerals are natural.

Our predecessors' wisdom in terms of discovering the effects of lye, developing food culture in noodles by kneading lye with flour, fostering the variety of tastes in the course development, and promoting the health of human beings should be reconsidered as "wisdom for life" and I believe this is part of our very valuable food culture that should be passed on to the next generations.

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## 沖縄の伝統食文化である木灰ソバの歴史と製造に関する研究

仲間勇栄

### 要 約

本論文では、沖縄の伝統的食文化の一つである木灰ソバの意義について、その歴史と製造の面から考察した。現在、木灰ソバは中国甘肅省蘭州、タイのチェンマイ、沖縄の三箇所で確認されている。琉球への伝来は、14世紀末の中国からの「久米三十六姓」の渡来以降説と、中国からの冊封使による来琉（1372）以降の説が有力と考えられる。この木灰ソバが一般庶民のポピュラーな食べ物となるのは、明治以降のことではないかとみられる。灰汁に使われる樹種は、戦前ではアカギ、イヌマキ、ガジュマル、モクマオウ、

ゲッキツ、現在では、主にガジュマル、イジュ、イタジイ、モクマオウなどである。木灰ソバは天然の樹木の灰から灰汁を採り、それを小麦粉に練り込んでつくる。普通の沖縄ソバでは人工のかん水が使われる。天然の灰汁には、カリウムやナトリウムなどのミネラル成分の他に、微量成分が数多く含まれている。これらの無機成分は、人間の健康維持にとっても不可欠のものである。この天然の灰汁でソバを作るとき、pH値12~13、ボーメ度2~3程度が良好とされる。この天然の灰汁で作る木灰ソバは、味覚の多様性を養う健康食品として、後世に伝えていくべき価値ある麺食文化の一つである。