The history of brewing and rice milling for sake

by Satake

Our agriculture started with sake brewing. People offered harvested rice, sake and rice cake to the gods. Sake is part of everyday living and its development covers a long historical journey. Here we introduce the history of sake brewing, the people who contributed to rice milling and sake brewing technology, and modern sake brewing technology.

Start of rice cultivation

It is said that 7,000 – 10,000 years ago rice cultivation started in the mountains around Assam India and Yunnan province China. Rice cultivation came over to the Northern Kyushu area of Japan through the lower reach of Chang Jiang and the Korean Peninsula around 400 B.C. It reached Setouchi and Kinki areas in around 350 B.C. encompassing the entire area of East Japan by around 100 B.C.

History of sake brewing

It is believed that the methods of sake brewing were brought to Japan with rice cultivation. Priestesses chewed rice during which the effects of saliva hydrolyze polysaccharides such as cellulose or starch by dilute acid and enzymes and glycosylate it into sucrose or glucose. This was simple sake making by spitting chewed rice into a pot and fermenting it by wild yeast. It was not liquid form and too perishable to generate large quantities.

In the year 701, a government office named "Sakebe no tsukasa" (Control of making sake) was established and sake brewing managed by imperial court had started. It led to the technique of sake brewing taking a step forward. Around the year 1000, it is said that there were about 10 kinds of brewing method and they were differentiated. For example, for low-level functionaries, people diluted the concentration of sake to increase its quantity.

By 1300, sake came to enjoy equal economic value to that of rice.

Around 1500, people brewing sake, added rice malt, steamed rice and water twice. They also applied lactate fermentation and prompted the neutralisation of acid in sake by wood ash. Around 1580, the "3-step brewing method" was adopted. This method brews sake over 3 days, the quantity produced differing by the day. The fundamental sake brewing technique was established during this period. Prior to this, malted rice was added to brown rice while the main constituent of sake was white rice (Katahaku). A newer method where all the ingredients including malted rice were made from white rice was also introduced (Morohaku) which improved the quality of sake even more. During this period, a new tub containing 1,500kg of ingredients was developed and the brewage increased by a factor of four to five times that of previous. This made possible the large-scale production of sake.

Around the year 1600, wooden mortar replaced by the grindstone, which led to the efficient milling of rice. With increasing manpower, the ability to mill rice increased. Karausu, which was brought from China, transformed milling work. In addition to the 3-step brewing method, today's many techniques of brewing sake were also developed.

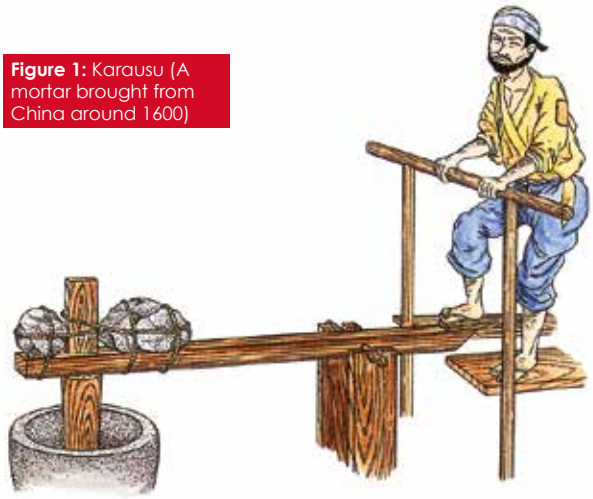

Figure 1: Karausu (A mortar brought from China around 1600)

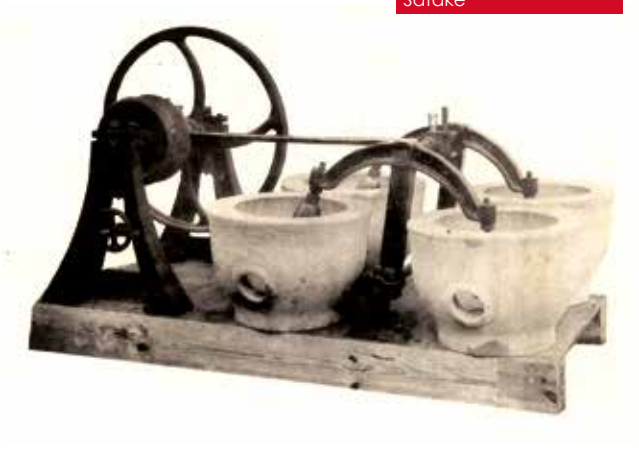

Figure 2: Japan's First Power Driven Rice Milling Machine - Invented by Riichi Satake

For example, preservation through heating (to sterilise sake by boiled water), protection from spoiling, large brewage in Cedar tubs and transportation by cedar tubs etc., (Figure 1).

Establishment of modern technique of brewing

The Research institute of brewing in the Ministry of Finance was founded in 1904. It aimed to contribute to improvement of quality in alcoholic beverages and stable production. It also tried to solve scientifically the current brewing techniques which hitherto had relied on brewers' experience and theory's handed down from generation to generation. In 1906, the brewing association was established within the institute and a sake fair, sponsored by the association, was held for the first time. At this fair, brewers from Hiroshima won first and second prizes of the special top 5. When it came to the percentage of prize winning (top 1 to 3) by prefecture, Hiroshima marked 77.4 percent. In the second fair in 1909, Hiroshima achieved an even higher percentage: 85.8 percent.

Some brewers struggled to progress in the making of sake, others who entered their own products to sake fairs were able to demonstrate improved brewing technique. In so doing these Brewers demonstrated their desire for prestige through skill and knowledge rather than profit. In this regard, three people in particular are accepted as contributing to the advancement and spread of sake

These three notable originators of sake from Hiroshima
were Wahei Kimura (Founder of sake brewery "Kamotsuru"), Senzaburou Miura (Inventor of brewing with soft water) and Riichi Satake (Inventor of domestic power-driven milling machinery).

In 1863, Riichi Satake was born in the present Saijonishihonmachi, Higashi-hiroshima, Hiroshima as the first son of the Satake family of farmers. It was in 1878, at age of 15, during the laborious work of karausu that the first new ideas started to flash through his mind on how to improve the process. However as he was about to start trials on a new type of rice milling machine, he was appointed person in charge for water management of Namitakiji Lake, the largest lake in Hiroshima Prefecture.

In 1893, immediately after finishing this work, he was assigned commander of line construction for the railway between Mihara and Hiroshima. This later became the Sanyo line. Furthermore, he was then chosen for the post of line construction between Kyoto and Nara.

It was 1895 by the time he was able to start the development of

the rice-milling machine.

By 1896, Riichi had invented the first power-driven milling machine in Japan. He not only designed it but also produced its parts by himself. However, dissatisfied with the results, he recalled three of the machines which he had already delivered and added a further improvement, his invention of the four linked type mortar power-driven milling machine. In 1908, he invented the second Satake circulating power-driven milling machine, now including an emery milling chamber and an internal spiral roll.

The current milling machine for sake brewing was structured in 1930. At this time Satake invented the vertical abrasive power-driven milling machine (type C). This Type C machine was the first to adopt the disc-type milling-roll that was hardened through heating of the emery, and exhibited much superior grinding. Usually milling yield was 70 percent (30% removal) by milling with water wheels and mixed abrasive powders, however the type C achieved 40 percent of milling yield (60% removal of outer layers) leading to better quality Sake.

When rice makes contact with the milling roll during rice milling, its shape is retained by complicated abrasive milling action; for example the structure of milling roll includes two layers of small and large diameter rolls. By reputation from people who have used this vertical milling machine, it has become widely known throughout the sake industry.

Figure 3: Vertical Rice Milling Machine for Sake Brewing

Figure 4: RMDB Type Rice Milling Machine for Sake Brewing

Along with pioneering developments in rice types suitable for sake brewing and developments in new yeasts, this led to the continued innovative evolution in sake brewing technology. The premium sake “ginjoshu” was born.

The structure of the type C machine is still in continued use, now in the guise of the present DB / RMDB type of sake rice milling machine. While not changing the basic mechanism, this machine continues the onward development with automatic control of speed of rotation and load depending on the milling yield. However, nothing can take the place of the milling roll that stands out as the best work by its developer Riichi Satake (Figure 2, 3 and 4).