ADVENTURE GUIDEBOOK TO SAKE BREWING

Terminology & Brew Notes

ABSTRACT

Sake is the traditional alcoholic drink brewed in Japan. There are a variety of styles and techniques to explore during sake production that contribute to the quality and taste of sake. Best of all, sake is easy to make from a rice mash! This guidebook serves as an introduction and aids homebrewers in exploring the world of sake brewing.

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Sake Buddy

A terminology guide for the budding sake enthusiasts

Created by Dr. Matt Winans of Imperial Yeast for Home Brew Con 2022 in Pittsburgh, PA

People & Places

Izakaya	Japanese style pub and restaurant.
Kura	A sake brewery.
Kuramoto	The sake brewery or sake brewery owner.
Toji	Sake Brew Master and expert in sake brewing. The toji is the leader of the other sake brewery workers.

Sake Consumption

Aminosan-do	**T**he amino acid rating. The more the amino acid content, the richer the sake will taste. The less the amino acid content the lighter the sake will taste.
Gen-shu	Undiluted sake from moromi sake mash. This sake has a strong flavor and high alcohol content. Can be enjoyed chilled, with cold water added, or with warm water added.
Ginjo-shu	1 of 3 tax categories from Japan. This sake was brewed with highly polished rice (60%) for a long time at cold temperatures. This style was traditionally only attempted by expert sake masters as the epitome of craft sake for its delicate flavor, aroma, and fruitiness. Best served chilled.
Go-mi	Five flavor virtues of sake that include *karami (*dry*), nigami (*bitter*), shibumi (*astringent*/*tart*), amami (*sweet*), sanmi (*acidic*).*
Honjozo-shu	1 of 3 tax categories from Japan. Distilled alcohol is added to the sake ferment of polished rice (70%) before filtering and harvesting of the sake to enhance its characteristics. This style of sake is often served warm. Of the 920 entries into the 2009 Japanese National New Sake Awards, 92% contained distilled alcohol to enhance flavor.
Junmai-shu	1 of 3 tax categories from Japan. This sake is made from only rice and koji. No distilled alcohol is added. It is rich and enjoyed in various ways and temperatures.

Kan	Traditional sake serving style where the sake is warmed (42 - 45^{o}C) before consuming.
Kiki-choko	Competition sake drinking cup with ring design to aid in visual examination. White pattern used to scrutinize color and blue pattern used to scrutinize clarity
Kiki-zake	Sake tasting, it can be formal for competition.
Nama-chozo-shu	Sake pasteurized once after the maturation period. Normal sake is pasteurized twice, once before bottling, and once after bottling.
Nama-zake	Unpasteurized sake. Normal sake is pasteurized twice, once before bottling, and once after bottling. This sake has a fresh aroma and best served chilled.
Nama-zume-shu	Sake pasteurized once before the maturation period. Normal sake is pasteurized twice, once before bottling, and once after bottling.
Nigori-zake	Cloudy sake filtered through a course cloth and considered good table sake. It was not traditionally pasteurized, but recent market analysis shows that pasteurized nigori-zake is becoming more popular.
Nihon-shu	Rice fermented sake beverage of Japan. Common terminology among the Japanese people.
Nihon-shu-do	Sake Meter Value (SMV). This is a number rating system for sweetness (-) or dryness (+) of a sake. This is measured by comparing the sake gravity at 15^{o}C to water at 4^{o}C Calculated by performing the following equation = ([1/Specific Gravity]-1)*1443.
O-choko	Ubiquitous sake drinking cup. They are small in size (<2oz) affordable, stylish, durable, and heat tolerant. They often come in sets of four with a larger serving vessel.
Sake	Japanese word for alcohol, also can be called shu. Most English speaking are referring to nihonshu (rice based fermented beverage) when speaking.
San-do	Acidity rating of packaged sake. The acidity of sake contributes a strong characteristic on sensory analysis. Acidity of sake can often mask the residual sweetness.
Taru-zake	Nomenclature describing sake stored and served in wooden cedar casks which facilitates the infusion of aromatic compounds into the sake.
Umami	The flavor of savouriness of a food or drink. It is highly associated with the amino acid called glutamic acid & Japanese cuisine.

Sake Brewing

Arabashiri	The first harvest from the sake mash gathered without forcing pressure of the fermented moromi.
Sokujo-moto	Modern and popular method of producing sake mash via lactic acid adjustment of the pH and pure sake yeast addition.
Hatsuzoe	The first doubling of the sake mash by steamed rice addition.
Kasu	Sake rice lees often found as a pressed cake from harvesting sake. This is used in a variety of ways for eating, cooking, pickling, further fermentations, even beauty products. Sake kasu has about 8% ABV.
Kumo	Foam/clouds of the sake mash.
Moromi	The main sake mash and fermentation where all the ingredients are together. This is where the rice starches are converted to simples sugars which the sake yeast convert into alcohol. Fermented at cold temperatures ~ 15^{o}C.
Moto	Seed or starter sake mash that is acidic and rich in nutrients. Harmful bacteria can not survive the acidity of the moto/subo. Commonly known as a sake mother.
Naka-zoe	The second doubling of the sake mash by steamed rice addition.
Naka-dori	The second cut of the sake harvest from the moromi sake mash. This harvest requires light pressure and is regarded as the best and most true representation of the sake made.
Odori	This is the day of rest after the first doubling of the main sake mash build up and may be named so because of the image of dancing bubbles a top of the sake mash.
Shi-zuku	Traditional and rustic method of harvesting sake by suspending sake mash into bags for gravity filtration. Translated in over it means sake droplets.
Seme	The last bit of sake harvested from the moromi sake mash due to high pressure of the sake lees cake.
Subo	*See moto…*
Sugidama	Cedar ball that hangs on the outside of the sake brewery. Soft green cedar sprigs are fashioned into a ball at the beginning of the sake brewing season and hung outside of the brewery door. The timing of color change from green to brown coincides with the timing of the maturation process in traditional sake making. When the cedar ball is brown, passersby know the sake is ready to consume. Modern restaurants and specialty shops hang this cedar ball as a sign of quality sake selection.

Tomezoe	The third doubling of the sake mash by steamed rice addition.
Yodan	The adjustment or stabilization phase of sake fermentation where you decide if dilution, maturation, pasteurization, or alternative processing is desired.

Sake Rice

Nuka	Rice flour or powder removed during the washing process before steaming rice.
Seimai-buai	Sake rice polishing rate. This determines the style of sake as either Honjozo/Junmai (70%), Ginjo/Junmai Ginjo (60%), or the premium Daiginjo/Junmai Daiginjo (50% or less)
Senmai	Rice washing step for preparing of rice for sake brewing.
Shinpaku	Opaque white starchy endosperm core of the rice kernel.
Shuzokotekimai	Rice varieties that are good for sake brewing. They have a longer grain shape than rice normally consumed for food. In the 2010 Sake Brewing season, there were greater than 90 varieties of rice grown in Japan.

Microbiology

Awanashi-Kobo	Foamless variants of sake yeast. Strains are identified by -01 suffix and aid in fermentation volume, labor, and sanitation.
Kobo	*Saccharomyces cerevisae* or sake brewing yeast.
Koji	*Aspergillus oryzae,* a filamentous fungus in the same genus as common bread mold. This yellow mold variety is utilized by sake brewers to infiltrate rick kernels via their hyphae. In the sake mash, the koji enzymes are used to convert starches to simple sugars. In a sake mash, koji rice should be 20 - 25% of total rice.
Koji-kin	The spores of koji mold which are used to inoculate a new batch of koji rice.
Kyokai-kobo	Sake brewing yeast strain maintained and distributed by the Brewing Society of Japan since ~ 1900. Implementing propagated yeast strains significantly improved sake brewing quality and consistency.
Kyokai-kobo #7	Worlds most popular and versatile sake yeast with a vigorous fermentation. Best suited for full-body, earthy, and mellow esters of Junmai, honjozo, and futushu. Its acidity edges on strong, but brewery operations manage strength well. Discovered in 1946 by brewer at Masumi in Nagano. pularized by the aid of Dr. Shoichi Yamada of the Brewing Society of Japan.

Kyokai-kobo #9 Most popular yeast for competition ginjo sake desiring high fruity esters. The reliable fermentation yields a slightly acidic finish. Discovered by the Koro research brewery in Kumamoto Prefecture.

Ginjo Style Sake

Notes from Dr. Matt Winans 2022 sake brewing trial

Materials, literature, & base recipe acquired from FH Steinhart (Portland, OR).

Shubo (sake mother)

- Day 1
    a. Mix 600 ml of distilled water + 3.8 ml brewers lactic acid [88%] + 4g yeast nutrient (fermaid K containing DAP and yeast hulls) + 700mg Epsom salt [pure] until dissolved, then separate to 120ml and 480ml aliquots. Store both containers at 4^{o}C until use.
        - Mix the 480 ml container of water, acid, & nutrient solution to a cold 155 ml homebrew pack of Imperial Yeast A49 Goodness, A27 Hiroshi, or I22 Capri. Add 115g of fresh or thawed koji to a 2gal wide mouth container, then add the yeast solution to koji to make the beginning of a shubo. Store cold if possible.
    b. Wash and steep 340g of sake rice [60% polish] for 1 hour by periodically filling with cold tap water, mixing, and dumping cloudy water.
        - Allow all water to drain from the rice by placing over a fine mesh cheese cloth in a kitchen strainer.
    c. Steam drained rice for 1 hour then remove from steam, place in a cool, clean, and dry area to facilitate cooling and drying of the freshly steamed rice. Once the initial cooling takes place (approximately 5-10 min), add the 120ml ml of cool nutrient water to the steamed rice. Target temperature of steamed rice and water mix is 30^{o}C.
    d. Add the cool steam rice mixture to the yeast & koji mixture in the 2 gal wide mouth container. Target temperature = 22^{o}C. Mix thoroughly with care and a gentle touch.
        - Mix shubo every 12 hours & keep away from light
- Day 2
    a. Continue to mix every 12 hour or so. Target temperature = 23^{o}C.
        - The water level will fall below the mash initially
- Day 3
    a. Continue to mix every 12 hour or so. Target temperature = 23^{o}C.
- Day 4
    a. Continue to mix every 12 hour or so. Target temperature = 23^{o}C.
        - Fermentation activity and floral ester aroma expected
- Day 5
    a. Continue to mix every 12 hour or so. Target temperature = 20^{o}C.
- Day 6
    a. Continue to mix every 12 hour or so. Target temperature = 15^{o}C.
- Day 7
    a. Add 205g of fresh or thawed koji rice + 355 ml of distilled water to the shubo.
        - Aliquot 295ml distilled water, store at 4^{o}C until use.
    b. Continue to mix every 12 hour or so. Target temperature = 15^{o}C.
        - Alcohol content of 5%+ expected

"Main Build Up"

Hatsuzoe (doubling sake mash #1)

- Day 8
    a. Wash and steep 570g of sake rice [60% polish] for 1 hour by periodically filling with cold tap water, mixing, and dumping cloudy water.
        - Allow all water to drain from the rice by placing over a fine mesh cheese cloth in a kitchen strainer.
    b. Steam drained rice for 1 hour then remove from steam, remaining in the cheesecloth spread out (approximately 2" thick or less) in a cool, clean, and dry area to facilitate cooling and drying of the freshly steamed rice (approximately 15 min). Break up chunks.
    c. After the initial rice cooling add the cooled rice and the 295 ml of cold distilled water to the 2 gal wide mouth fermentor containing the shubo.
        - Target temperature of 13^{o}C. Maintain fermentation environment absent of light.
        - Mix sake mash every 12 hours for 48 hours

Odori (Dance& Rest)

- Day 9
    a. Maintain sake mash mixing schedule and fermentation environment.
    b. Add 320g koji + 1.2L of distilled water to sake mash and mix approximately 24-36 hours post hatsuzoe rice steaming
        - Aliquot 887ml distilled water and store at 4^{o}C until use.

Nakazoe (doubling sake mash #2)

- Day 10
    a. Wash and steep 1.36kg of sake rice [60% polish] for 1 hour by periodically filling with cold tap water, mixing, and dumping cloudy water.
        - Allow all water to drain from the rice by placing over a fine mesh cheese cloth in a kitchen strainer.
        - Sanitize 5 gallon homebrew bucket, lid, and paddle.
    b. Steam drained rice for 1 hour then remove from steam, remaining in the cheesecloth spread out (approximately 2" thick or less) in a cool, clean, and dry area to facilitate cooling and drying of the freshly steamed rice (approximately 20 min). Break up chunks.
    c. After the initial rice cooling add the cooled rice and the 887 ml of cold distilled water into the 5 gal wide mouth homebrew fermentor bucket containing the transferred sake mash from the 2 gal.
        - Target temperature of 15^{o}C. Maintain fermentation environment absent of light.
        - Mix sake mash every 12 hours
    d. Add 500g of fresh or thawed koji rice + 2.4L of distilled water to the sake mash.
        - Aliquot 1.4L of distilled water, store at 4^{o}C until use.

Tomezoe (doubling sake mash #3)

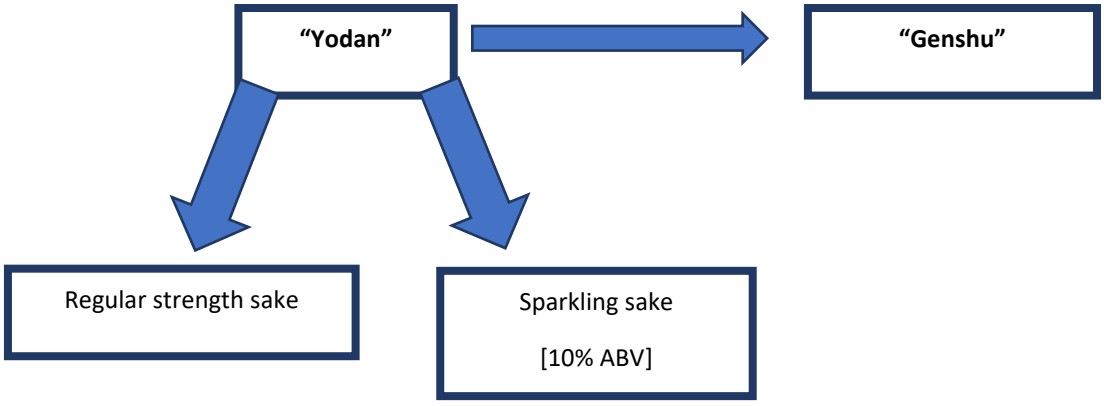
- Day 11
    a. Wash and steep 2.27kg of sake rice [60% polish] for 1 hour by periodically filling with cold tap water, mixing, and dumping cloudy water.
        - Allow all water to drain from the rice by placing over a fine mesh cheese cloth in a kitchen strainer.
    b. Steam drained rice for 1 hour then remove from steam, remaining in the cheesecloth spread out (approximately 2" thick or less) in a cool, clean, and dry area to facilitate cooling and drying of the freshly steamed rice (approximately 30 min). Break up chunks.
    c. After the initial rice cooling add the cooled rice and the 1.4L of cold distilled water to the 5 gal sake mash fermentor bucket.
        - Target temperature of 15^{o}C. Maintain fermentation environment absent of light.
        - Mix sake mash every 12 hours

Moromi

- Day 12
    a. Continue to mix every 12 hour or so. Target temperature = 15^{o}C. Maintain fermentation environment absent of light. Watch for foam over.
- Day 13-27
    a. Continue to mix every 12 hour or so. Target temperature = 15^{o}C. Maintain fermentation environment absent of light. Watch for foam over.

Yodan

- Day 28
    a. If SG < 0.0 you can either decide to make full alcohol strength genshu sake or adjust to ordinary sake by diluting with 1180ml of water to approximately 16.5% ABV
        - Use a distiller hydrometer to aid in correct ABV & act conservatively with water additions.
    b. Use mesh strainer bags to filter sake lees and/or use a wine filter press to extract fluid.
        - Expected volume ca. 9.5L
            - Roughly filtered sake can be enjoyed fresh "Nigori" style
                - *Must store at 4^{o}C with loose caps to avoid pressure explosion*
        - For more refined sake, transfer roughly filtered sake to 1 gal bottles with airlocks for maturation



Use a distiller hydrometer to find the alcohol content of your sake

page 1 of 4 - Correction table for an alcoholometer calibrated at 20°C (under column corresponding to mixture temperature, find measured value of ethanol concentration in %abv and read the actual concentration in the left column of the same row)

Actual C (%abv)\T (°C)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0																					0.0	0.2	0.3	0.5	0.7	0.8
1																	0.5	0.6	0.7	0.9	1.0	1.2	1.4	1.5	1.7	1.9
2	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.2	2.4	2.5	2.7	2.9
3	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	2.9	3.0	3.2	3.4	3.6	3.8	3.9
4	2.5	2.5	2.5	2.5	2.5	2.5	2.6	2.6	2.7	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.5	3.6	3.7	3.9	4.0	4.2	4.4	4.6	4.8	5.0
5	3.5	3.5	3.5	3.5	3.5	3.4	3.5	3.6	3.6	3.7	3.7	3.9	4.0	4.1	4.2	4.3	4.5	4.6	4.7	4.9	5.0	5.2	5.4	5.6	5.8	6.0
6	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.5	4.6	4.6	4.7	4.8	5.0	5.1	5.2	5.3	5.5	5.6	5.7	5.9	6.0	6.2	6.4	6.6	6.8	7.0
7	5.2	5.2	5.2	5.2	5.2	5.3	5.3	5.4	5.5	5.5	5.6	5.8	5.9	6.0	6.2	6.3	6.4	6.6	6.7	6.9	7.0	7.2	7.4	7.6	7.8	8.0
8	6.1	6.1	6.1	6.1	6.1	6.1	6.2	6.3	6.4	6.4	6.5	6.7	6.8	6.9	7.1	7.2	7.4	7.5	7.7	7.8	8.0	8.2	8.4	8.6	8.9	9.1
9	6.9	6.9	6.9	6.9	6.9	6.9	7.0	7.1	7.2	7.3	7.4	7.6	7.7	7.9	8.0	8.1	8.3	8.5	8.7	8.8	9.0	9.2	9.5	9.7	9.9	10.1
10	7.7	7.7	7.7	7.7	7.8	7.8	7.9	8.0	8.1	8.2	8.3	8.5	8.6	8.8	8.9	9.1	9.2	9.4	9.6	9.8	10.0	10.2	10.5	10.7	10.9	11.2
11	8.5	8.5	8.6	8.6	8.6	8.6	8.8	8.9	9.0	9.1	9.2	9.4	9.5	9.7	9.8	10.0	10.2	10.4	10.6	10.8	11.0	11.2	11.5	11.7	12.0	12.2
12	9.3	9.4	9.4	9.4	9.5	9.5	9.6	9.7	9.9	10.0	10.1	10.3	10.5	10.6	10.8	10.9	11.1	11.3	11.6	11.8	12.0	12.3	12.5	12.8	13.0	13.3
13	10.1	10.2	10.2	10.2	10.3	10.3	10.5	10.6	10.8	10.9	11.0	11.2	11.4	11.5	11.7	11.8	12.1	12.3	12.5	12.8	13.0	13.3	13.5	13.8	14.1	14.3
14	10.9	10.9	11.0	11.1	11.1	11.2	11.3	11.5	11.6	11.8	11.9	12.1	12.3	12.4	12.6	12.8	13.0	13.3	13.5	13.8	14.0	14.3	14.6	14.8	15.1	15.4
15	11.6	11.7	11.8	11.9	11.9	12.0	12.2	12.3	12.5	12.7	12.8	13.0	13.2	13.4	13.6	13.7	14.0	14.2	14.5	14.7	15.0	15.3	15.6	15.9	16.2	16.5
16	12.4	12.5	12.6	12.7	12.8	12.9	13.0	13.2	13.4	13.5	13.7	13.9	14.1	14.3	14.5	14.7	14.9	15.2	15.5	15.7	16.0	16.3	16.6	16.9	17.2	17.5
17	13.2	13.3	13.4	13.5	13.6	13.7	13.9	14.1	14.3	14.4	14.6	14.8	15.0	15.2	15.4	15.6	15.9	16.2	16.5	16.7	17.0	17.3	17.6	18.0	18.3	18.6
18	13.9	14.1	14.2	14.3	14.4	14.6	14.8	14.9	15.1	15.3	15.5	15.7	15.9	16.1	16.4	16.6	16.9	17.2	17.4	17.7	18.0	18.3	18.7	19.0	19.3	19.7
19	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.8	16.0	16.2	16.4	16.6	16.8	17.1	17.3	17.5	17.8	18.1	18.4	18.7	19.0	19.3	19.7	20.0	20.4	20.7
20	15.4	15.5	15.7	15.9	16.0	16.2	16.4	16.6	16.8	17.0	17.3	17.5	17.7	18.0	18.2	18.5	18.8	19.1	19.4	19.7	20.0	20.3	20.7	21.0	21.4	21.7
21	16.1	16.2	16.4	16.6	16.8	17.0	17.2	17.4	17.7	17.9	18.1	18.4	18.6	18.9	19.1	19.4	19.7	20.0	20.4	20.7	21.0	21.4	21.7	22.1	22.4	22.8
22	16.7	17.0	17.2	17.4	17.6	17.8	18.0	18.3	18.5	18.8	19.0	19.3	19.5	19.8	20.1	20.3	20.7	21.0	21.3	21.7	22.0	22.4	22.7	23.1	23.4	23.8
23	17.4	17.7	17.9	18.1	18.3	18.6	18.8	19.1	19.4	19.6	19.9	20.2	20.4	20.7	21.0	21.3	21.6	22.0	22.3	22.7	23.0	23.4	23.7	24.1	24.5	24.8
24	18.2	18.4	18.6	18.9	19.1	19.4	19.7	19.9	20.2	20.5	20.8	21.1	21.4	21.6	21.9	22.2	22.6	22.9	23.3	23.6	24.0	24.4	24.7	25.1	25.5	25.8
25	18.9	19.1	19.4	19.7	19.9	20.2	20.5	20.8	21.1	21.4	21.6	22.0	22.3	22.6	22.9	23.2	23.6	23.9	24.3	24.6	25.0	25.4	25.8	26.1	26.5	26.9
26	19.6	19.9	20.2	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.2	23.5	23.8	24.2	24.5	24.9	25.3	25.6	26.0	26.4	26.8	27.2	27.6	28.0
27	20.3	20.6	20.9	21.2	21.5	21.8	22.2	22.5	22.8	23.1	23.4	23.7	24.1	24.4	24.8	25.1	25.5	25.9	26.3	26.6	27.0	27.4	27.8	28.2	28.6	29.1
28	21.1	21.4	21.7	22.0	22.4	22.7	23.0	23.3	23.6	24.0	24.3	24.7	25.0	25.4	25.8	26.1	26.5	26.9	27.3	27.6	28.0	28.4	28.9	29.3	29.7	30.1
29	21.8	22.2	22.5	22.9	23.2	23.5	23.9	24.2	24.5	24.8	25.2	25.6	25.9	26.3	26.7	27.1	27.5	27.9	28.2	28.6	29.0	29.4	29.9	30.3	30.8	31.2
30	22.6	23.0	23.3	23.7	24.0	24.4	24.7	25.1	25.4	25.7	26.1	26.5	26.9	27.3	27.7	28.1	28.5	28.9	29.2	29.6	30.0	30.5	30.9	31.4	31.8	32.3

Material acquired from FH Steinbart and modification of their supplied recipe

More ways to enjoy Sake

<u>"El Toji" (Sake Margarita)</u>

Combine all ingredients into shaker over ice to mix. *Alternatively, you can combine over ice in a blender.*

- 1 oz (30ml) sake, *Junmai Ginjo*
- 1 oz (30ml) orange liquer, *Grand Marnier/Triple Sec*
- 1 oz (30ml) lime juice, *fresh squeezed*

Prepare cocktail glass by moistening about ½ inch of the rim via rubbing with lime/citrus wedge.

Prepare the citrus salt as follows *(optional). Spread the salt mixture evenly on a small saucer and roll the moistened rim over the salt to garnish the rim.*

Sweet Unami & Citrus Salt

Place salt into a mixing bowl and zest the citrus fruits using a grater or zester. *Do not zest the white pith.* <u>Mix thoroughly.</u>

- ½ cup salt, *sea*
- *2 tbl spn MSG (optional)*
- 1 lime (zested)
- 1 orange *(zested)*

Add sugar and coriander and continue to mix well.

- 1 cup sugar, *granular*
- 1 tsp coriander (ground)

Store cold in an airtight container until use.

Ginjo Beer or Sake-Yeast Beer

Color: Pale to dark brown

Clarity: Slight chill haze is acceptable

Perceived Malt Aroma & Flavor: Very low to medium

Perceived Hop Aroma & Flavor: Low to medium and in harmony with sake-like character

Perceived bitterness: Low to medium and in harmony with sake-like character

Fermentation Characteristics: These beers are brewed with sake yeast or sake (koji) enzymes. The unique byproducts of sake yeast and koji enzymes should be distinctive and in harmony with other elements. Sake character may best be described as having mild fruitiness and mild earthiness expressed as mushroom or umami protein-like attributes. A high amount of alcohol may be evident.

Body: Varies depending on original gravity. Mouthfeel also varies.

Additional notes: High carbonation should be present.

Original Gravity (°Plato) 1.040-1.090 (10-21.6ºPlato)

- **Apparent Extract/Final Gravity (°Plato)** 1.008- 1.020 (2.1-5ºPlato)
- **Alcohol by Weight (Volume)** 3.4%-8.2% (4.3%-10.2%)
- **Hop Bitterness (IBU)** 12-35 • **Color SRM (EBC)** 4-20 (8-40 EBC)

Brewers Association 2022 Style Guidelines

Notes:

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