*"Preserve today, Relish tomorrow"*

# Kombucha


**UCCE Master Food Preservers of El Dorado County**
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## Food Safety / Preserving Basics

Food preservation starts with food safety. Cleaning and sanitizing your work area, washing hands frequently, properly handling produce and meat, and avoiding cross-contamination are all part of the process in avoiding food-borne illness. Following recipes from trusted resources is the next step in ensuring safety when preserving food. Key things to keep in mind include:

**Clean Work Area ◆ Wash Hands ◆ No Cross-Contamination ◆ Prepare Food Properly**

For further details on cleaning and sanitizing, food safety, and information on a variety of food preservation topics, visit our Food Safety website, where you'll find free, downloadable publications and posters: https://link.ucanr.edu/mfp-cs-foodsafety

You can also access the site by scanning this QR code with your smartphone or tablet.

## About Kombucha

Kombucha is a beverage made by fermenting sweetened tea, resulting in a cider-like, slightly effervescent drink. Like many other ferments, such as yogurt or sourdough or cheese, it uses a starter culture, although the kombucha culture may look much different to what you're accustomed to. Known as a *SCOBY* (Symbiotic Colony of Bacteria and Yeast), the culture, when mature, resembles a somewhat gelatinous pancake or big flat mushroom. Due to this appearance it is sometimes called a "mushroom" or "tea fungus", but it is neither.

Kombucha contains beneficial live bacteria and yeasts, organic acids, B vitamins, antioxidants, and trace minerals. During the fermentation process, most of the sugar and caffeine are consumed. An 8-ounce serving of unflavored kombucha has only 30 calories and about 2-3 grams of sugar. Fruit, herbs or spices can be added for additional flavor and carbonation.

So where did kombucha originate? No one knows exactly, but it likely arose in China, where tea originated. The oldest legends date to 221 BCE, but other stories place the development of kombucha in much later. Regardless of when or where kombucha began, it is a refreshing and delicious alternative to soda.

## Tools & Supplies for Making Kombucha

For the most part you will need no special equipment to start making kombucha, other than your brewing and storage vessels. Here is a list of what you'll need to get started.

- Brewing vessel (glass, ceramic or other non-reactive material such as stainless steel) with a wide surface area, in a size slightly larger than (about 1.25 times) your batch size (see below for information about vessels for the continuous brew method)
- A fine-weave cloth or towel, or a coffee filter for covering the brewing vessel (do not use cheesecloth unless it is finely woven, such as butter or cheese muslin, because fruit flies can get through regular cheesecloth and contaminate your brew)
- A large rubber band for securing the cover
- Ladle
- Funnel (optional, but helpful for transferring the kombucha to bottles)
- Bottles or jars for the finished kombucha (see below)
- Heat wrap (optional, but helpful for brewing in cold climates)
- Fine-weave cheesecloth and/or a fine-mesh strainer for straining the kombucha

**A WORD ABOUT STORAGE BOTTLES:** The more carbonation, the greater the risk of your bottles exploding. Choose bottles with thick glass, such as heavy swing-top ("Grolsch-style") bottles. Round bottles tend to break less due to more even pressure distribution, so avoid bottles with square sides. Recycled thick beer bottles and the like are also options. Some people use wine or champagne bottles so that if too much carbonation builds up the corks will pop before the bottles break, but you may end up with a geyser – and thus still have a big mess on your hands. Mason jars are also an option, just be sure to keep the top of the kombucha away from any metal and choose an air-tight lid.

## Ingredients for Kombucha

**Water** Fresh, unchlorinated water is important for successful kombucha brewing, as chlorine can interfere with the fermentation process. Kombucha also prefers water lower in mineral content ("soft water") vs. hard water which contains high amounts of minerals. Tap water often contains chlorine or chloramines and may also contain fluoride, so check with your municipality to see if these chemicals have been added. Bottled water may come from springs, rivers or streams – or even municipal tap – so be sure to check the label carefully.

To remove chlorine from water, use a water purification filter; boil it for 20 minutes and allow to cool; or let it sit for 24 hours. *Note: Once chlorine is removed, refrigerate water to limit bacterial growth.* Note that boiling or using charcoal-based filters will not remove fluoride (and probably not chloramines), so check with the filter manufacturer for specifications.

To soften hard water, boil it for 15 minutes, cover and let sit for 24 hours, then skim off any scum and pour carefully so as not to disturb sediment on the bottom of the container.

## Ingredients for Kombucha (cont.)

**Tea** True tea is made from *Camellia sinensis* leaves, with four main categories: White, Green, Oolong, and Black. These categories are determind primarily by how much the tea leaves are oxidized. A fifth type, called *Pu'erh*, is a fermented and aged tea which can also be used to make kombucha. Any tea type or combination of types can be used to make kombucha, although it is generally recommended that you start with 100% black tea for the first several batches. Avoid teas with oil (such as Earl Grey) or spices (such as masala chai), as the oils can interfere with fermentation and may lead to moldy SCOBYs.

Once you have some experience – and several strong healthy SCOBYs – you can experiment with blending teas, including using herbal teas. Herbal teas should be combined with at least 25% true tea, but 50-75% true tea is best. Because some herbal teas contain essential oils that can impact the health of the culture, use a backup SCOBY and maintain it separately, at least until you know that it is healthy and shows positive growth.

*White Tea* Unprocessed, minimally oxidized. Liquor is very pale green or yellow. Flavor is flowery and delicate. Makes a mild, flowery-tasting kombucha. When brewing kombucha, it is best blended with black, oolong, or green tea.

*Green Tea* Delicately processed, minimally oxidized. Liquor is green or yellow. Flavor ranges from toasty, grassy, to fresh steamed greens with mild astringency. Makes a lighter, softer kombucha. The younger the green tea, the lower the brewing temp should be to prevent bitterness.

*Oolong Tea* Partially oxidized, described as halfway between green and black. Rich floral or fruity flavors and smooth, soft astringency. Makes a milder, somewhat fruity and grassy kombucha with an amber color. Oolong is a good base when flavoring for a 2$^{nd}$ fermentation.

*Black Tea* Fully oxidized. Liquor ranges from dark brown to deep red. Strong flavor and astringency. Makes a bold, fruity-tasting and amber-colored kombucha. Steep at a relatively high temp and moderate length of time for maximum flavor without bitterness.

**Sugar** For successful fermentation of kombucha, sugar – in the correct proportions – is required. It is the source of fuel and provides the nutrients necessary to maintain the health of the SCOBY. Reducing the amount of sugar or fermenting for too long a period could starve the culture.

Sugar substitutes do not provide the necessary nutrients for kombucha and are not recommended. Sugars or syrups from plants other than sugar cane such as agave, maple, or coconut palm can produce inconsistent results and may be hard on the SCOBY. These are not recommended for kombucha. Less refined sugars have a higher mineral content and produce deeper flavors; these sugars may produce a more sour kombucha. Honey contains bacteria that can compete with kombucha SCOBYs. Use pasteurized honey only when making kombucha.

## Ingredients for Kombucha (cont.)

*White Cane (Table) Sugar* Refined sugar cane, pure white in color, and free of minerals. Good for brewing kombucha.

*Organic Cane Juice Crystals* Less refined than white sugar, pale blond in color, and low in mineral content. Very good for making kombucha.

*Brown Sugar* White sugar with molasses added back in; high in mineral content. Because it produces a yeasty kombucha SCOBY and may shorten a SCOBY's life, it is not recommended for making kombucha.

*Turbinado or Raw Sugar* Slightly less refined than cane juice crystals, turbinado sugar has had most of the molasses removed. It has a medium mineral content, and like brown sugar it produces a yeasty kombucha SCOBY and may shorten SCOBY life, thus it's not recommended for kombucha.

*Rapadura/Sucanat* These sugars are made from pressed and dried sugar cane juice and are high in mineral content. They are not recommended for brewing kombucha.

## Kombucha Safety & Precautions

To avoid contaminating your SCOBY, make sure your hands are scrupulously clean – your work area and tools too! – and that your brewing vessel is clean as well. To clean your brewing vessel, wash it with hot non-chlorinated water, or wash with hot soapy water (avoid anti-bacterial soaps as these may interfere with fermentation), rinse very well, and then "cure" the vessel with pasteurized vinegar (do not use raw vinegar).

If you see any signs of mold (such as fuzzy blue, gray, green, brown, or black areas), throw away the SCOBY and the kombucha and wash the vessel thoroughly. You may see brown strands or strings floating through the kombucha, attached to the underside of the SCOBY, or accumulated at the bottom of the brewing vessel. These are yeast that have collected together; they are safe and are a normal part of kombucha fermentation.

There are trace amounts of alcohol left from the fermentation process that in some cases may exceed 0.5 percent alcohol by volume (ABV), which exceeds the legal limit for non-alcoholic beverages. In most cases the residual amounts do not exceed 1% ABV, and they naturally top out at around 2% ABV. These amounts are non-inebriating, but to reduce the amounts you can avoid fruit and other sugary flavorings; refrigerate the kombucha quickly; leave more headspace in the bottles; or dilute individual servings with water.

## How Much Kombucha Should I Drink?

When consuming any new food or beverage, including kombucha, start with small amounts. Drink up to 4 ounces per day with plenty of water, observe your own body's reactions, then gradually increase your consumption.

## The Basic Procedure for Making Kombucha

The following recipe makes approximately 12 cups of kombucha using the **batch method**. You'll need a one-gallon jar or other brewing vessel. The recipe can be scaled up or down depending on the size of your brewing vessel or desired amount of kombucha.

12 cups water, divided
3 – 5 tea bags
¾ cup sugar
1 large SCOBY
1 cup kombucha starter liquid

### Primary Fermentation:

1. Bring 4 cups of water just to a boil. Turn off the heat, add the tea, and allow to steep for 5 to 15 minutes.

2. Remove the tea bags, add the sugar, and stir until dissolved. Allow to cool.

3. Pour the remaining 8 cups of water into the brewing vessel and add the sweet tea. Be sure the liquid in the brewing vessel is at room temperature before continuing.

4. Add the SCOBY to the brewing vessel, then pour the starter liquid over the SCOBY.

5. Secure a cloth or paper cover over top of the brewing vessel with a rubber band and set it aside out of direct sunlight (if you are using a glass jar and don't have a pantry, cupboard or other dark place for fermenting, place a dishtowel(s) over the jar to block light).

6. Allow the kombucha to ferment in a warm area with good air flow for 7 to 14 days (possibly up to 1 month). Kombucha likes warmer temperatures (72° – 85°F, with 78 to 80°F being ideal). The warmer the temperature, the quicker your kombucha will ferment (small batches finish faster, as well). If possible, keep your fermenting kombucha away from other ferments to avoid cross-contamination.

7. Start tasting your brew after 7 days (as early as 5 days if it's really warm). Stop fermenting when the kombucha reaches the taste you like (the longer you ferment, the more sour the kombucha will become).

8. Remove the SCOBY (including the "baby" or "daughter" SCOBY that grows from the original, or "mother" SCOBY) to a clean jar or storage vessel (see the section on SCOBY Hotels below). Using a ladle, take 1 to 2 cups of kombucha from the TOP of the brewing vessel and add it to the SCOBY Hotel.

9. Transfer the finished kombucha to storage bottles or jars either directly or by first straining through cheesecloth or a fine-mesh strainer, leaving very little head space. Cap tightly and store at room temperature for 1 to 3 days to build up carbonation, or refrigerate immediately. For a secondary fermentation, see below.

## The Basic Procedure for Making Kombucha (cont.)

### Secondary Fermentation ("2F"):

A secondary fermentation can be done in the original brewing vessel or in separate bottles or jars, although 2F done in the storage bottles is best consumed within a few weeks, as flavoring agents left in the bottles can end up causing off flavors. Add clean, cut fruit or fruit juice and whatever herbs or spices you desire. Ginger, lemon, and berries are common additions, but let your taste buds guide you and feel free to experiment (see pg. 10 for information on flavor pairings). Keep in mind that ginger, blueberries and strawberries can increase carbonation, so you may need to "burp" your bottles to release excess $CO_2$.

To make a 2F, remove the SCOBY and kombucha liquid as per Step 8 above. Add your flavoring agent(s) of choice (see below), and replace the cloth cover. Let ferment at room temperature for 1 to 3 days. Strain the kombucha to remove the flavorings and excess yeast, and then transfer to bottles and cap tightly. Refrigerate immediately, or allow to sit at room temperature for 1 to 3 days to build carbonation, and then refrigerate.

To flavor kombucha, add about 5% or so of the bottle/vessel capacity. Cut fruit into small pieces, or use fruit purées or juice. Purees and juice, as well as powdered herbs and spices, can increase carbonation, so reduce the amount (or open the bottles carefully!).

So how much is that 5%? A little flavoring goes a long way, especially if you've cut the fruit small (more surface area means more flavor gets dispersed). A tablespoon or so of fresh fruit or a pinch of herb in a batch may be all you need.

**SINK OR SWIM?** SCOBYs can float on the surface of your brew, sink to the bottom of the brewing vessel, or hover somewhere in the middle. The position of the SCOBY (and which side faces up) does not affect the kombucha. Regardless of where the "mother" SCOBY is, the new "baby" SCOBY will grow on the surface.

## Continuous Brewing

The **continuous brew method**, versus the batch method described above, is a safe and convenient way to make kombucha. Because handling of the SCOBY is minimized, the risk of contamination is lower, as is the amount of time and effort required to brew your kombucha. You can also brew larger amounts at one time (generally 2 to 5 gallons).

You'll need a food-safe (glass, ceramic, or stainless steel) brewing vessel with a spigot. A 2-gallon vessel will make 1½ gallons; large households or serious homebrewers may want a 5-gallon vessel, which will make 4 gallons of kombucha. The spigot of your vessel should be non-corrosive and leak-proof.

## Continuous Brewing (cont.)

The process of continuous brewing is essentially the same as with the single batch method. The following recipe is for a 2½-gallon vessel (to make about 2 gallons of kombucha).

2 gallons water, divided
8 – 12 tea bags
2 cups sugar
2 large SCOBYs
2 – 4 cups mature starter liquid

1. Bring 2 quarts of water just to a boil. Turn off the heat, add the tea bags, and allow them to steep for 5 to 15 minutes.

2. Remove the tea bags, add the sugar, and stir until dissolved. Allow to cool.

3. Pour the remaining 6 quarts of water into the brewing vessel and add the sweet tea. Be sure the liquid in the brewing vessel is at room temperature before continuing.

4. Add the SCOBY to the brewing vessel, then pour the starter liquid over the SCOBY.

5. Secure a cloth or paper cover over top of the brewing vessel with a rubber band and set it aside in a warm location with good air flow and out of direct sunlight (if using a glass vessel and you don't have a pantry, cupboard or other dark place to ferment your kombucha in, place a dishtowel(s) over the vessel to block light). If possible, keep your fermenting kombucha away from other ferments to avoid cross-contamination.

6. Allow the first batch to ferment for 10 to 28 days.

7. Once the kombucha has reached a taste you like, decant your desired amount. Take no more than one-third of the total volume from the initial batch. Once your kombucha has matured (after 3 to 5 cycles), you can remove up to two thirds of the vessel amount, although it's recommended to generally remove no more than 50%.

8. Transfer the decanted kombucha to a large jar or individual storage bottles (you can also decant it directly into bottles). Flavor the brew if desired (see Secondary Fermentation above), cap it tightly, and store at room temperature for 1 to 3 days to build up carbonation, or refrigerate immediately.

9. Refill the brewing vessel with cool sweet tea, gently pouring it along the side of the vessel to limit disturbing the SCOBY. To make 1 gallon of sweet tea, steep 4 – 6 tea bags in 4 cups of hot water for 10 to 15 minutes. Remove the tea bags, add 1 cup of sugar and stir to dissolve. Add the remaining water, then cool to room temperature.

## Continuous Brewing (cont.)

Your continuous brewing vessel will need occasional maintenance. Once your mother SCOBY becomes too thick, or if the kombucha becomes too sour too quickly or looks like it has too much yeast, you'll need to do some upkeep. How often you perform maintenance is a preference, although once or twice per year is about average.

To perform maintenance, remove the mother SCOBY to a clean bowl. Start trimming the SCOBY by removing the oldest layers from the bottom of the SCOBY (they will be darker in color) by pulling off the layers or by using a serrated knife or scissors. Then trim away gelatinous pieces from the sides, leaving a healthy white or tan SCOBY. Next cut the SCOBY down to about ¾ of the diameter of the brewing vessel and no more than ½" thick (you can cut the SCOBY down into layers or into pieces that equal this amount). Return the trimmed SCOBY to the bowl, and transfer the extra pieces to a SCOBY Hotel if you wish to keep them for future use (see the section on SCOBY Hotels below).

Next, remove at least 5 cups of kombucha from the vessel to use as a starter liquid (the more reserved and used as a starter, the quicker the next batch will ferment). If the liquid is cloudy, filter it through a strainer or cheesecloth. Pour the kombucha over the SCOBY in the bowl, then cover the bowl with a clean towel. Decant the remaining kombucha in the brewing vessel into bottles or a SCOBY Hotel.

Remove and disassemble the spigot from the empty brewing vessel, then clean it well under hot running water. Use a toothpick if necessary to dislodge any bits of SCOBY that may have grown inside the spigot parts. Then rinse out the brewing vessel with hot non-chlorinated water (alternatively wash with soap and hot water, rinse well, and then cure the vessel with pasteurized – not raw – vinegar). Replace the spigot and test it for leaks. Lastly, add the SCOBY and reserved starter liquid, and proceed with a new batch following the recipe above.

## Maintaining Your SCOBYs (the "SCOBY Hotel")

Start a SCOBY Hotel to house your extra SCOBYs. Add them to a clean, large glass jar with 2-4 cups of starter liquid, and cover with a tight-weave cloth secured with a rubber band. Reserve a cup or more of kombucha each time you brew to add to the jar along with the SCOBY.

Maintain your SCOBY Hotel periodically to keep your SCOBYs healthy. If the top SCOBY grows too thick (more than 1"), it can prohibit oxygen from reaching the liquid below it and stagnate or kill off the bacteria and yeast. Remove the SCOBY to a separate container, cover with a clean cloth, and let it drain for a bit for easier handling. Then pull it apart into layers or trim it with a serrated knife or sharp scissors. While the big thick SCOBY is draining, remove the other SCOBYs as necessary, one at a time, trimming off dark bits and gelatinous edges, and return them once they're cleaned to the Hotel.

Dark and cloudy liquid is a sign of excess yeast, which needs to be removed (generally every 2 to 6 months). To do so, move the SCOBYs to a container and cover with a cloth. Pour the liquid through a fine-mesh strainer or cheesecloth. Large strands of yeast will not pass through, but sufficient yeast will remain in the liquid. Do not rinse the SCOBYs, but if necessary pull off large clumps of yeast. Rinse the Hotel with hot non-chlorinated water, scrubbing it if necessary (alternatively wash with soap and hot water, rinse well, and then cure with pasteurized – not raw – vinegar) and return the SCOBYs to the Hotel. Pour the filtered liquid over the SCOBYs, add some sweet tea, then cover with a cloth.

## Maintaining Your SCOBYs (the "SCOBY Hotel") (cont.)

Add sweet tea as needed to replace evaporated liquid and to keep the SCOBYs submerged. Sweet tea also provides food for the SCOBYs. Cover the Hotel with a cloth (as opposed to a lid) for at least a few weeks after adding sweet tea so that it can ferment properly.

To make sweet tea for your SCOBY Hotel, steep 1 tea bag in 2 cups of hot water, add 2 tablespoons of sugar and stir to dissolve, then cool to room temperature.

A SCOBY will generally be viable for at least 10 brewing cycles. If it stops performing or becomes mushy or it grows jellylike on the edges, discard it.

## Flavor Pairings

When it comes to flavoring your kombucha, you are limited, really, only by your own creativity. Feel free to experiment! If you'd like to venture beyond familiar taste combinations, such as apple & cinnamon, or strawberries & balsamic, there's a world of exciting herb and spice combinations to try. How about cherry & black pepper, or blueberry & lemon verbena? The books included in the References and Resources sections below have some great ideas, and there are plenty of free online sources as well.

**References:**

Colorado State University Extension, Understanding and Making Kombucha. https://foodsmartcolorado.colostate.edu/recipes/preservation/understanding-and-making-kombucha/
Page, Karen & Andrew Dornenburg. *The Flavor Bible*

**Additional Resources:**

UC Master Food Preservers of Central Sierra https://link.ucanr.edu/mfp-cs
UC Master Food Preserver Program https://mfp.ucanr.edu/
National Center for Home Food Processing https://nchfp.uga.edu/
USDA Complete Guide to Home Canning https://nchfp.uga.edu/resources/category/usda-guide
So Easy to Preserve https://setp.uga.edu/
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