

Fermentation

Kimchi, Kombucha, Kefir

Kimchi

Lacto (Lactic Acid) Fermentation: Lactic acid bacteria (LAB) are present in the soil and, therefore, on the things that grow in the earth. Lacto (lactic acid) fermentation is the craft of preserving foods by methods that attract this naturally occurring good bacteria. These probiotics transform the sugar in foods into lactic acid keeping food safe from bad bacteria and other food spoilers and creating tangy-tasting ferments. There are three methods used to ferment vegetables and fruits: dry salted (sauerkraut method), brined, and kimchi (which uses a combination of dry salt and brine methods). All of these methods draw the moisture from vegetables and fruits and create brine in which the food remains submerged throughout the ferment. It is this brine that attracts good bacteria and produces the acids that create an environment inhospitable to bad bacteria. The key to a successful ferment is to keep the vegetables and fruit completely submerged in the brine.

Mold: Occasionally, mold will appear on the surface of the ferment. It can be round and fuzzy, blue, black or pink. Don't get mold confused with Kham yeast, which looks like a white milky film. Mold forms when the ferment is exposed to air, if the salt ratio is wrong, if the vegetables and tools aren't clean, if you used chlorinated water, and other things. If there are small amounts of mold forming on pieces of vegetables that are above the brine, throw those pieces away. If there is a thin layer of mold on top of the brine, either skim it off or throw the entire ferment away and start over. In theory, everything below the brine should be fine. Some people are sensitive to mold and should avoid it completely, while it doesn't affect others. If mold forms inside the fermentation jar, don't eat it! Something is wrong with it.

Making Baechu (Bet-schu) Kimchi: Mack Chopped Cabbage) Style (Makes about 2 quarts)

Ingredients:

- 2 medium heads Napa cabbage (about 6-8 pounds total)
- 1-1/2 cups coarse salt, non-iodized, divided (baked or sea salt recommended)
- 1 gallon + 1/2 cup cold water, divided
- 2 tablespoon sweet rice flour
- 1-10 cloves garlic, depending on taste preference
- About 3 slices fresh ginger root (about 0.2-0.4 oz.)
- 1 cup Korean red pepper powder – specific “for kimchi”
- 1/2 Korean radish (about 1-1.5 pounds), or daikon radish
- 1 Asian pear (optional)
- 10 green onions
- 1 teaspoon fish sauce (optional)
- 2 teaspoon finely ground salt (optional, as needed)

Directions:

1. Prepare Napa cabbage:
 - a. Rinse heads under cold water and drain.
 - b. Cut away and discard any spoiled or damaged spots.
 - c. Cut Napa cabbage into four quarters and remove core from each. Chop quarters into 2-inch pieces.
2. Salt cabbage:

- a. Prepare saltwater solution of 1/2 cup coarse, non-iodized salt and 1 gallon cold water in large mixing bowl.
 - b. Dip cabbage pieces briefly in the saltwater solution, to facilitate penetration of salt into the cabbage pieces. Discard saltwater solution.
 - c. Drain and place cabbage pieces in a bowl. Sprinkle 1 cup of coarse, non-iodized salt over the cut cabbage and massage it into the cabbage well. Allow cabbage to sit covered at room temperature for 3 to 6 hours (a longer time will make it saltier).
 - d. Rinse cabbage pieces 3 to 4 times with cold water to rinse away the salt, then place in a colander to drain out excess water from the cabbage for at least 30 minutes.
3. Prepare seasonings:
- a. Add sweet rice flour to 1/2 cup water in small saucepan. Bring to a boil and set aside to cool.
 - b. Clean, peel, and finely mince (or use blender with small amount of water) garlic and ginger. Mix the cooled sweet rice flour paste and add Korean red pepper powder.
 - c. Clean and peel radish, clean and trim green onions, and if desired, clean and peel Asian pear. Slice all Julienne style, or into match sticks about 1 inch in length.
 - d. Using clean hands and disposable food handler gloves, mix above seasoning paste and Julienned vegetables together in large mixing bowl. Then mix in fish sauce to create a spicy veggie paste. Add salt only as needed.
 - e. Combine cabbage with the spicy veggie paste, rub together and mix thoroughly.
4. Pack container:
- a. Pack kimchi tightly into container, minimizing air exposure and encouraging brine formation. Fill container 2/3rd full, as fermenting microorganisms will release carbon dioxide and create bubbling and fizzing.
 - b. Cover tightly. If using jars, seal to finger-tip tight. If using bags, squeeze out excess air. Place on plate or in bowl to catch potential overflow.
5. Ferment:
- a. Option 1: Kimchi may be placed in refrigerator so it ferments slowly over 3 to 4 days. This may be preferred, especially during hot weather.
 - b. Option 2: Place sealed container in a well-ventilated location (may become pungent), with a relatively constant room temperature, around 68°F is ideal. Ferment only 1 to 2 days at room temperature, tasting it daily until it reaches preferred tangy taste and desired texture.
6. Store and enjoy:
- a. Store fermented kimchi covered tightly in the refrigerator. Keep it pressed down to minimize air exposure. Kimchi may become more sour over time. Discard if you observe indications of surface mold.
 - b. Kimchi can be enjoyed in countless recipes! Try it with eggs, rice, noodles, potatoes, in stir fry, fried rice, soup, pancakes, or on a sandwich or hot dog. Happy kimchi making!

Source: Colorado State University Extension, Farm to Table, "Understanding and Making Kimchi"

Fried Kimchi Rice (Serves 2 as entree; 4 as side dish)

Ingredients:

2 cups cooked white rice
1 tablespoon sesame oil
1 cup kimchi, coarsely chopped
1/4 cup kimchi juice
2 green onions, finely chopped
1/2 cup fresh or frozen green peas (thawed)
1 tablespoon sesame seeds, toasted

Process:

- Heat wok and add sesame oil.
- When oil is hot, add rice and stir-fry until hot and lightly browned in spots.
- Add kimchi, kimchi juice and green peas. Stir-fry for 2 or 3 minutes, until mixture is warm.
- Serve topped with green onions and sesame seeds.

Source: Amador/Calaveras Master Food Preserver

Kombucha and Kefir

Symbiotic Fermentation: Kombucha is a fermented, slightly sweetened and slightly tangy tea that has been around for centuries. It is thought to have a variety of health benefits and contains high levels of antioxidants, b-vitamins, and probiotics. SCOBY (Symbiotic Colony of Bacteria and Yeast) is a mix of cultures of bacteria and yeast present when making kombucha, kefir and other foods made through symbiotic fermentation. Kefir is a fermented milk beverage. As the milk ferments, it thickens slightly, and depending upon how long it is fermented, the flavor ranges from milk to extremely tart, somewhere between the taste of buttermilk and sour cream. Unlike yogurt and other dairy ferments which are made from a bit of the previous batch as a starter, kefir is started from a SCOBY, rubbery blobs known as kefir grains, which are strained out after fermentation and then used to start the next batch.

Kombucha

Ingredients: (Makes about 1 gallon)

- 1/4 cup green and/or black tea (in mesh bag), or 4-8 tea bags
- 1 gallon of filtered water
- 1 cup cane sugar
- 1-2 cups Kombucha Starter Liquid (from a previous batch)
- 1 SCOBY

Directions:

1. Heat water. In brewing vessel, make tea. Steep tea for 10 minutes.
2. Remove tea leaves or bags. While water is still hot, stir in sugar and completely dissolve.
3. Allow sweetened tea to completely cool to room temperature.
Note: Alternative method to cool faster: heat only half the water in step #1, to make a strong sweet tea, then add the remaining water as cold water.
4. Once cooled to room temperature, add SCOBY and Kombucha Starter Liquid to sweetened tea.
5. Cover with clean cloth or coffee filter. Secure with a rubber band or bungee cord to keep insects and contaminants out but allow air flow. Record start date.
6. Allow kombucha to ferment at room temperature (ideally 64-79°F/18-26°C) for 7-14 days. A new SCOBY will develop on the surface of the liquid, starting as a light haze that gradually turns whitish, then opaque and thicker as time progresses. Taste after a week. Stop fermenting when you like the flavor.
7. To “stop” fermenting: pour kombucha into clean jars or bottles sanitized by rinsing with boiling water or vinegar, retaining SCOBY and at least 1-2 cups for your next batch. Save more, at least 20%, if following continuous brew technique (see below).
8. Flavor finished kombucha as desired with 10-20% juice or clean fruit, and experiment with clean herbs and spices based on preference. Cap tightly. Leave at room temperature 1-3 days for potential carbonation or refrigerate immediately.
9. **CAUTION:** Longer time capped at room temperature could result in carbon dioxide accumulation and even explosion of the contents.
10. **Note:** An alternative to adding juice or fruit after the first ferment (see step 8, above) is to use a flavored tea, such as Chai Black tea, in step 1, above. Included below is a recipe for Chai Spice Blend.

Repeat batches using continuous brew technique:

To minimize handling the SCOBY and reduce introduction of contaminants, it is better to leave the SCOBY and starter liquid in the vessel and not wash the vessel between uses, but only if it becomes built up with yeast. Gently pour in new sweetened, cooled tea along the inside of the jar to limit disturbing the SCOBY. SCOBY growth can be peeled and shared with others or stored for several weeks in a similar cloth covered vessel, covered by kombucha.

Source: *Colorado State University Extension, Farm to Table, “Understanding and Making Kombucha”*

Chai Spice Blend (Yield: 2 tablespoons pre-ground, 1/3 cup hand-ground) When flavoring kombucha, use less of the pre-ground spices, as they will impart more intense flavor than the coarser powder produced by hand-grinding. A good rule of thumb is 1 teaspoon of pre-ground blend = 1 tablespoon of hand-ground.

Ingredients:

2 teaspoons ground allspice or 7 allspice berries
2 teaspoons ground cardamom or 1 tablespoon cardamom pods
2 teaspoons ground cinnamon or 1 cinnamon stick, broken
1 teaspoon ground cloves or 4 whole cloves
1 teaspoon ground coriander or 1 tablespoon coriander seeds
2 teaspoons ground ginger or 1/4-inch piece diced ginger
1/2 teaspoon ground pepper or 1 teaspoon whole peppercorns
1 teaspoon ground star anise or 3 whole star anise pods

Note: If using powdered spices, combine them in an airtight container, cap tightly, and shake well. If using whole spices, place them all in a spice grinder and pulse until finely ground, and then transfer to an airtight container. Store at room temperature for up to a year.

Source: *The Big Book of Kombucha, 2004*

Milk Kefir

Ingredients:

1 quart pasteurized milk
1 tablespoons kefir grains

Process:

- Fill a 1-quart jar with milk. Add the kefir grains and loosely cap.
- Ferment at room temperature for about 24 hours, tightening the cap and agitating the jar periodically. The agitation is important, as it brings more of the milk into contact with the grains and distributes fermentation activity. Loosen the cap after agitation.
- Strain out the grains with any straining implement. You may need to use a spoon or clean finger to stir and coax the thickened milk through the strainer.
- Seal the strained kefir in a jar and leave it at room temperature for another 12 to 24 hours to carbonate (if desired). The fermentation continues even without the grains because all the organisms in them are now part of the kefir. (With so much more limited sugar content in milk, there is no need with kefir to worry about the jar exploding, as with kombucha.
- Meanwhile, cover the kefir grains with fresh milk and start the next batch. Kefir works best as a continuous rhythm. Keep your batches small so you do not get overwhelmed.
- Curdling. If you leave your kefir to ferment for a few days, it will curdle and separate. You can remix it by shaking, and enjoy sour kefir. Or, when the thick creamy kefir floats above the whey, you can gently scoop it out and enjoy it like sour cream. Use the whey for other fermentation adventures or in other cooking or baking.
- Kefir grains grow and multiply in number over time. If you keep the scale of your production constant, it will ferment faster as the ratio of grains to milk increases. Eventually you will need to cull the extras. You only need a tablespoon or so of grains per quart of milk. Share the extras, eat them, feed them to your pet, or toss them into the compost.
- Hiatus. The best way to store kefir grains if you need to suspend production is to pat them dry, seal them in something airtight, and freeze them.
- Note: The National Center for Home Food Preservation recommends that only pasteurized milk be used. Because of the small risk of pathogen growth in home fermented kefir, it is NOT recommended for those with weakened immune systems, e.g. pregnant women, the elderly, the very young and the chronically ill.

Sources: *National Center for Home Food Preservation website; Wild Fermentation, 2016*

Sources

National Center for Home Food Preservation: <http://nchfp.uga.edu/>

Colorado State University Extension, Colorado Farm to Table

Wild Fermentation, The Flavor, Nutrition, and Craft of Live-Culture Foods, Updated and Revised Edition, 2016

The Big Book of Kombucha, 2004

Dom's Kefir-making in-site Website: <http://users.chariot.net.au/~dna/Makekefir.html> (Accessed April 1, 2017)

No endorsement of product/company included in this handout is intended, nor is criticism implied of similar products/companies that are not included.