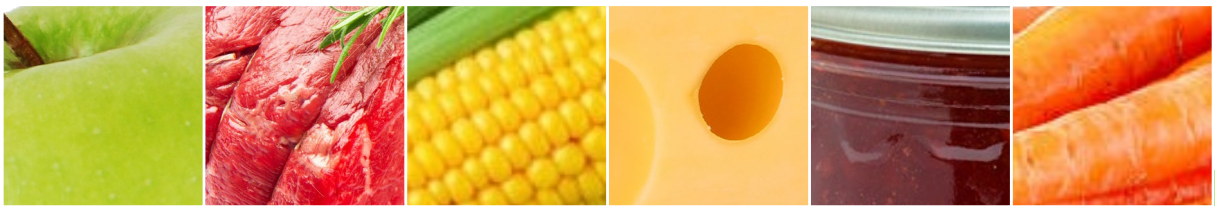
ENHANCING THE SAFETY OF

LOCALLY PREPARED FOODS

Farmers Market Food Safety Tool Kit



Publication FST-297P (FST-361P)

What do I need to know to sell KOMBUCHA at the farmers market?

What is kombucha?

Kombucha is a beverage made from brewed tea and sugar that is fermented using a Symbiotic Culture of Bacteria and Yeast (generally abbreviated as SCOBY). Kombucha is slightly sweet and acidic often containing residual carbon dioxide. Some kombuchas also have fruit juice or other flavors added. Kombucha is generally made using the following steps (adapted from Nummer, 2013):

Table 1. General steps to produce kombucha

1	Boil water
2	Add tea and steep for 10 minutes
3	Remove tea leaves and cool
4	Add 10% inoculum (SCOBY).
5	Ferment at room temperature for 7 – 10 days
6	Refrigerate covered
7	Filter or remove culture mass

Why produce kombucha?

It is a beverage consumed in many countries and is quickly becoming a popular beverage in the United States because it has perceived health benefits.

What is the fermentation process and why is it important?

Kombucha is produced using a two-step fermentation process. In the first step, the yeast in the SCOBY ferments the added sugar and forms alcohol and carbon dioxide. In the second step, the bacteria in the SCOBY ferments the alcohol to produce vinegar (acetic acid). Production practices and fermentation conditions will influence the percent of alcohol and vinegar in the final product.

For this reason, alcohol production must be monitored closely! Food and beverage products that contain greater than 0.5% alcohol are subject to Alcohol Beverage Control Authority (ABC) and/or Alcohol and Tobacco Tax and Trade Bureau (TTB) regulation and taxation. Additionally, if fermentation continues for too long, excess vinegar may be produced making the product too acidic for frequent consumption.

Figure 1. Stirring tea on the stove during preparation of kombucha. Photo by Kevin Rail.

Why does kombucha continue to ferment after the **SCOBY** is removed?

Your kombucha will continue to ferment after the SCOBY is removed because tiny fragments of the SCOBY will remain in the beverage. If you do not pasteurize (heat treat) your product, the remaining yeast and bacteria will continue the fermentation process until there is no sugar left to ferment. This could lead to a beverage that is high in alcohol and/or dangerously acidic. Additional ingredients like juice or other flavorings could also contain sugar and allow for further fermentation, producing even more alcohol or vinegar.

How do I know if TTB Regulation is required for my product?

Kombucha producers must be aware that fermentation continues unless deliberately stopped. Therefore, the kombucha beverage could have less than 0.5% alcohol by volume when it is bottled, but the fermentation may continue after bottling. As a result the

"This work is supported by Food Safety Outreach Program [grant no. 2016 0020-25888/project accession no. 1010671] from the USDA National Institute of Food and Agriculture"

Virginia Cooperative Extension
Virginia Tech • Virginia State University

2020 Publication FST-297P (FST-361P)

alcohol content could increase to greater than 0.5% during storage or sale. If this happens, the product is subject to TTB regulations (TTB 2017).

Am I **REQUIRED** to test the alcohol content of my kombucha?

To protect yourself from regulatory action, you should produce kombucha that does not exceed 0.5% alcohol by volume at any time during production, storage, transport or retail sale. The only reliable way to confirm that your product has less than 0.5% alcohol, is to test it. You should test your finished product at the time of bottling as well as the unpasteurized bottled product after weeks of storage. You may have to limit the time for sale at market (shelf life) if the alcohol content rises above 0.5%. Additionally, if at any time during the production, storage, or sale, your kombucha exceeds 0.5% you will be subject to TTB regulation, regardless of whether you dilute the product prior to sale.

What are some guidelines for producing kombucha safely?

- Ensure that hot water (>165°F) is used to steep the tea.
- Use cleaned and sanitized containers and utensils at all steps.
- Ferment in a non-metallic food grade container.
- Ensure that the SCOBY used in your fermentation comes from a reliable or certified source. It is highly recommended that you purchase your SCOBY commercially for first use. Do not pass SCOBY cultures from one person to another.
- Ferment in the presence of air, but keep the fermenting tea covered with a clean cheesecloth or coffee filter secured using a rubber band.
- Monitor the pH with a calibrated pH meter during fermentation to ensure the product gets to ≤4.2. To prevent the product from getting dangerously acidic, the pH should be no lower than 2.5.

Figure 2. A jar of kombucha fermenting in the open air, covered with cheese cloth. Photo by Kevin Rail.

- After 7-10 days, refrigerate the kombucha with a tight fitting lid. Refrigeration prevents mold growth and the tight fitting lid allows carbon dioxide to build up.
- Filter or remove the SCOBY using cleaned and sanitized equipment.
- Pasteurize product. Pasteurization will kill the culture in the remaining SCOBY fragments and prevent further alcohol, carbon dioxide or vinegar production. This process will produce a shelf stable product that does not require refrigeration. Steps include (adapted from Nummer, 2013):
  - Confirm pH is <4.0.
  - Heat kombucha to 180°F and bottle immediately
  - Cap bottle
  - Hold bottle for 30 seconds
  - Invert bottle onto its cap and hold for another 30 seconds
  - Allow to cool.
- Product that is not pasteurized should be held at refrigeration and sold as a refrigerated product. Refrigeration limits alcohol and excessive acid production.

How do I test for alcohol content?

Producers may use any method that has been scientifically validated to detect alcohol content in food and beverages. When TTB tests samples of kombucha products from the marketplace, it generally uses the distillation-specific gravity method (AOAC reference 935.21), using a densitometer instead of a pycnometer.

You may contact the Beverage Alcohol Lab of TTB for appropriate methods of testing to determine the alcohol level in your kombucha:

Alcohol and Tobacco Tax and Trade Bureau
Director, Scientific Services Division
6000 Ammendale Road
Beltsville, Maryland 20705-1250
(240) 264-1665

Virginia Tech Department of Food Science and Technology Analytical Service Laboratory has two TTB certified chemists who can test your kombucha for alcohol content. For more information and to request analysis, please go to their website:

https://www.fst.vt.edu/extension/analytical_services_lab.htm

How do I monitor the pH during fermentation?

For safety and regulatory compliance, the acidity of your product should be measured. The measure of acidity is called pH. The most reliable method to measure pH is using a calibrated pH meter. There are inexpensive (less than $100) pH meters that are reliable and accurate. For accurate measurement using a pH meter, it is important to follow the pH meter manufacturer instructions for use and calibration. For more information on pH, please refer to the VCE publication #FST-58 Understanding the pH of Your Food (https://pubs.ext.vt.edu/FST/FST-58/FST-58NP.html).

How do I take care of my SCOBY?

Unhealthy SCOBY cultures can change your fermentation process and lead to an unsafe or overly alcoholic product. For your reference, figures 3-5 show healthy SCOBY and figures 6-8 show unhealthy SCOBY. Some ways to ensure the health of your SCOBY include:

- Do not share SCOBY with other producers
- Refrigerate SCOBY in a covered, cleaned, and sanitized food grade container covered with kombucha liquid from the last batch.
- Make sure the pH of reused culture is maintained at <4.2 to minimize the risk of contamination from harmful bacteria.

- Do not reuse SCOBY that smells unusual, or shows signs of mold.

What are the steps if I want to sell my kombucha?

1. Decide where you are going to produce your product:
   - Out of your inspected home kitchen?
   - Out of an inspected community or commercial kitchen?
2. Familiarize yourself with the regulatory process of starting a food business
   - Refer to VDACS Home and Commercial Kitchen based businesses website for more information
3. Test your kombucha for alcohol content. It is recommended that you measure samples over the entire shelf life of your kombucha to ensure that the alcohol content never exceeds 0.5%.
4. Validate your fermentation process through an expert in fermentation processes. In some cases, this may be a process authority. For a list of process authorities, please consult the Association of Food and Drug Officials for a list of food process authorities: http://www.afdo.org/foodprocessing.
5. Complete and submit the correct application that pertains to where you will be producing your kombucha (Application for Home Food Processing Operation or Application for a Commercial Kitchen Food Processing Operation).
6. After you submit you application, VDACS will contact you with further questions and/or to schedule an inspection when you application is considered complete.
7. Comply with all regulatory and labeling requirements as stated by VDACS.
   - Please note, the label should include a consumer advisory that states "no more than 4 ounces per day is recommended".

Figure 3. (Top) Healthy SCOBY. Photo by Sihui Ma.

Figure 4. (Right) Healthy SCOBY floating on top of fermenting tea. Air bubbles are normal and indicate fermentation taking place. Photo by Kevin Rail.

Figure 5. (Below) Healthy SCOBY added to empty jars prior to adding tea and starting fermentation. Photo by Sihui Ma.

Figure 6. Unhealthy SCOBY – SCOBY on top of the brew covered with white and blue mold. Photo by Kombucha Kamp. www.kombuchakamp.com

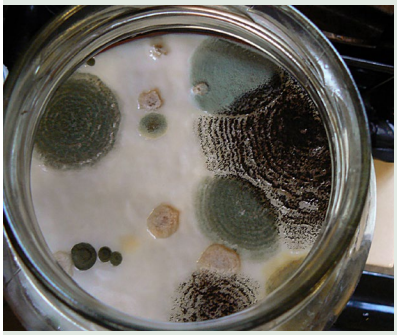


Figure 7. Unhealthy SCOBY – Green and white mold embedded in the SCOBY. Photo by Kombucha Kamp. www.kombuchakamp.com

Figure 8. Unhealthy SCOBY – Brown powder kombucha mold on top of the SCOBY. Photo by Kombucha Kamp. www.kombuchakamp.com

References:

Alcohol and Tobacco Tax and Trade Bureau. 2017. Kombucha Information and Resources. Available at: https://www.ttb.gov/kombucha/kombucha-general.shtml#general.

Nummer, B. A. 2013. Kombucha brewing under the Food and Drug Administration Model Food Code: Risk Analysis and Processing Guidance. Journal of Environmental Health. 76(4):8-11.