Posse+Plus, Wood County Texas

Fermentation of Vegetables and Fruits

Basic Fermentation of Vegetables and Fruits

Books: "The Art of Fermentation," by Sandor Ellix Katz, "Nourishing Traditions," by Sally Fallon, "Preserving Food Without Freezing or Canning," by Chelsea Publishing
Free ebook "Lacto-Fermentation" http://www.culturesforhealth.com/learn/free-ebooks/
Websites: www.thehealthyhomeeconomist.com, www.westonaprice.org, www.culturesforhealth.com, www.mercola.com

Why Ferment Foods

(www.culturesforhealth.com) Lacto-fermentation, in one form or another, has existed in just about every society and culture that we have record of. From sauerkraut in Germany to kimchi in Korea, lacto-fermented foods are prevalent in pre-industrial societies.

The reason for this is simple: The process of fermentation allows foods to stay edible longer. While a cabbage might rot within a couple of weeks at room temperature, sauerkraut can be kept for months, and in some cases years.

The brine used in lacto-fermented foods creates an anaerobic, acidic environment. Anaerobic means that there is no oxygen present in the environment. Many lacto-fermented recipes emphasize keeping the food below the level of the brine because the "bad guys" are unable to grow in this environment, while the "good guys" have everything they need.

Many people familiar with home food preservation are concerned about botulism. Botulism is a toxin produced by *C. Botulinum* bacteria and cannot survive in an acidic environment. The acids produced by fermentation protect against the toxin, and help to make lacto-fermentation one of the safest methods of food preservation.

Canning food is a lot of work. Jars must be sterilized, packed properly and boiled for a long period at the proper temperature. Pressure canning equipment needs to be checked regularly by a professional. Lacto-fermentation is as simple as chopping up some vegetables, mixing them with some salt and maybe water, and allowing them to ferment. That's it!

Where freezing and canning require a lot of energy in the form of gas or electricity, lacto-fermentation can be done easily with neither of these things. For people looking to be self-sufficient or less dependent on fuels in general, lacto-fermentation is definitely the way to go.

Lacto-fermentation is safe, easy, healthy, and economical. Gallons of lacto-fermented vegetables may be kept in cool storage for months, providing enzyme-rich foods during the darkest periods of the year when fresh produce is scarce.

In the canning and freezing process some or all of the nutrients present in the freshly picked food are lost. Lacto-fermentation enhances the nutritive value of the food, and many enzymes and probiotics are created.

(www.mercola.com) Cultured or fermented foods have a very long history in virtually all native diets, and have always been highly prized for their health benefits.

The culturing process produces beneficial microbes that are extremely important for human health as they help balance your intestinal flora, thereby boosting overall immunity. Moreover, your gut literally serves as your second brain, and even produces more of the neurotransmitter serotonin—known to have a beneficial influence on your mood—than your brain does, so maintaining a healthy gut will benefit your mind as well as your body.

Fermented foods are also some of the best chelators and detox agents available, meaning they can help rid your body of a wide variety of toxins, including heavy metals.

Caroline Barringer is a Nutritional Therapy Practitioner (NTP), and an expert in the preparation of the foods prescribed in Dr. Natasha Campbell-McBride's Gut and Psychology Syndrome (GAPS) Nutritional Program.

She recommends eating about a quarter to half a cup (2 to 4 oz) of fermented vegetables or other cultured food, such as raw yoghurt, with one to three meals per day. Bear in mind that since cultured foods are very efficient detoxifiers, you may experience detox symptoms, or a "healing crisis," if you introduce too many at once. Caroline recommends beginning with very small servings and working your way up to the quarter- to half cup serving size. This way your intestinal microbiota has the chance to adjust.

"If they introduce too much, too fast, they will experience some die-off symptoms that can be uncomfortable and confusing. This is where we lose people. The innate intelligence of their bodies tells them to eat more cultured foods because they're in such a state of dysbiosis. So, they go to town and eat a whole jar of veggies. Then they go into a healing crisis and they are afraid to try cultured foods again."

"... Start slow, and that way you won't have a headache or you won't have that outbreak... you will start to see yourself eliminating more naturally, and the proper stool will form, the shape will change, and it will be all be beneficial to you. Let your innate intelligence guide you, and if you see something or feel something that's not so right, don't dismiss the cultured foods and say, "Oh, that was bad for me, it caused a reaction." That's not what your body's telling you. Your body's telling you, "Slow down."

Note: (Wikipedia) Dysbiosis (also called dysbacteriosis) is a term for a microbial imbalance or maladaptation on or inside the body, such as an impaired microbiota. For example, a part of the human microbiota, such as the skin flora, gut flora, or vaginal flora, can become deranged, with normally dominating species underrepresented and normally outcompeted or contained species increasing to fill the void. Dysbiosis is most commonly reported as a condition in the gastrointestinal tract, particularly during small intestinal bacterial overgrowth (SIBO) or small intestinal fungal overgrowth (SIFO). It has been reported to be associated with illnesses, such as

periodontal disease, inflammatory bowel disease, chronic fatigue syndrome, obesity, cancer, bacterial vaginosis, and colitis.

Typical microbial colonies found on or in the body are normally benign or beneficial. These beneficial and appropriately sized microbial colonies carry out a series of helpful and necessary functions, such as aiding in digestion. They also help protect the body from the penetration of pathogenic microbes. These beneficial microbial colonies compete with each other for space and resources and outnumber human cells by a factor 10:1.

Dysbiosis may be caused by such diverse things as repeated and inappropriate antibiotic exposure, alcohol misuse, or inappropriate diet.

When this balance is disturbed, these colonies exhibit a decreased ability to check each other's growth, which can then lead to overgrowth of one or more of the disturbed colonies which may further damage some of the other smaller beneficial ones in a vicious cycle. As more beneficial colonies are damaged, making the imbalance more pronounced, more overgrowth issues occur because the damaged colonies are less able to check the growth of the overgrowing ones. If this goes unchecked long enough, a pervasive and chronic imbalance between colonies will set in, which ultimately minimizes the beneficial nature of these colonies as a whole.

Microbial colonies also excrete many different types of waste byproducts. Using different waste removal mechanisms, under normal circumstances the body effectively manages these byproducts with little or no trouble. Unfortunately, oversized and inappropriately large colonies, due to their increased numbers, excrete increased amounts of these byproducts. As the amount of microbial byproducts increases, the higher waste byproducts levels can overburden the body's waste removal mechanisms.

It is the combination of these two negative outcomes that causes many of the negative health symptoms observed when dysbiosis is present.

Lacto-fermented foods normalize the acidity of the stomach. If stomach acidity is insufficient, it stimulates the acid producing glands of the stomach, and in cases where acidity is too high it has the inverse effect. Lactic acid helps break down proteins and thus aids in their assimilation by the body. It also aids the assimilation of iron. The decomposition in the stomach of the organic forms of iron depends on the quantity of hydrochloric acid present as well as the amount of vitamin C, which is why sauerkraut and other lacto-fermented vegetables rich in this vitamin have such a favorable influence…Lactic acid activates the secretions of the pancreas, which is particularly important for diabetics….Sauerkraut contains large quantities of choline, a substance that lowers blood pressure and regulates the passage of nutrients into the blood….Choline has another interesting property in that it aids the body in the metabolism of fats. If choline is lacking, fats accumulate in the liver…. Sauerkraut also contains acetylcholine which has a powerful effect on the parasympathetic nervous system. It helps reduce blood pressure, slows down the rate of heartbeat, and promotes calmness and sleep. As acetylcholine is destroyed by cooking, raw sauerkraut and its juice is preferable to cooked. Acetylcholine also has a beneficial effect on the peristaltic movements of the intestine. Sauerkraut and other lacto-fermented vegetables thus are recommended for constipation. (Annelies Schonech *Des Crudites* Toute L'Annee)

Vegetable Fermentation Methods
(www.culturesforhealth.com)

There are a few different ways to prepare brine for fermenting vegetables, including a method for fermenting without salt. Choose the process that works best for you from the following choices:

Method #1: Salt-only Vegetable Fermentation

Historically, salt was used to preserve foods before refrigeration. We recommend salt-only fermented vegetables at Cultures For Health, for many reasons:

- Salt pulls out the moisture in food, denying bacteria the aqueous solution they need to live and grow.
- Salt allows the natural bacteria that exist on the vegetables to do the fermenting. Only the desired salt-tolerant Lactobacilli strains will live and propagate.
- By suppressing the growth of other bacteria and mold, salt provides a slower fermentation process that is perfect for cultured vegetables that are to be stored for longer periods of time.
- Salt hardens the pectins in the vegetables, leaving them crunchy and enhancing the flavor.

➢ Use 1-3 tablespoons, sea salt per quart of water to prepare brine for fermenting vegetables.
(We prefer using the "Real Salt" brand.)

Method #2: Salt-free Vegetable Fermentation

Salt-free ferments, while often more bio-diverse, can result in mushy vegetables and mold. For a salt-free ferment celery juice or seaweed may be substituted, but they will not prevent a mushy texture.

Some freeze-dried starter cultures may be used on their own, without salt. Always follow the instructions included with the freeze-dried starter culture, for best results.

Method #3: Salt Plus Starter Cultures

Using some form of bacterial starter is said to speed up the vegetable fermentation process. While we recommend a salt-only ferment for vegetables, the following starter cultures may be used in addition to salt, if desired.

- Whey is dairy-based, so may not work for everyone. Make sure the whey is properly strained and fresh-tasting, as it will lend its flavor to the batch. Add salt along with the whey for flavor and to keep the vegetables crunchy.
- Freeze-Dried Starter Cultures: When using a freeze-dried starter culture, follow the instructions included with that culture, for best results.

Notes About Salt

The most common types of salt include sea salt, mineral salt, pickling salt, kosher salt, and iodized salt. Iodized salt also known as common table salt should not be used for fermentation because the iodine has a tendency to inhibit the growth of friendly bacteria. The anti-caking agents in iodized salt can cause cloudiness in water and salt solutions.

Unrefined sea salt is a good choice for fermentation. It can be identified by specks of color in the salt, including red, pink black or grey, indicating that the minerals have not been refined out of the salt.

Mineral salts such as Himalayan salt or "Real Salt" are a great choice for fermentation. They come from mines and are mineral-rich. They are usually pink or red in color and contain some white crystals.

Pickling salt can be used for fermentation. It is similar to table salt except it does not contain iodine. It also does not contain minerals. Minerals help keep the friendly bacteria healthy. Check the label to make sure it does not contain anti-caking agents.

Kosher salt can be used for fermentation but is not the best choice. The salt itself is not kosher but is used for koshering meats. It is very similar to table salt but with larger crystals. It usually contains less additives than table salt. It may not contain iodine but still have anti-caking agents.

Notes About Water

(The Art of Fermentation) Not all water is the same. The biggest problem with water from a fermentation perspective is the presence of chlorine. Chlorine is added to municipal water supplies specifically to kill microorganisms. If you add heavily chlorinated water into mixtures you wish to ferment, you may find that the chlorine prevents fermentation altogether, or slows, changes, or inhibits it. If you are working with chlorinated tap water, it is best to remove the chlorine. You can use filters to remove chlorine from water or you can boil the water in an open pot and the chlorine will evaporate. You need to cool the water down to body temperature before you can add it to a mixture of live cultures.

Notes About Whey

(www.thehealthyhomeeconomist.com) Whey must be homemade and can be easily made by straining the clear liquid from plain whole milk yogurt, kefir, or clabbered raw milk through a dishtowel or cheesecloth into a bowl.

When attempting to clabber milk, it is best to use raw milk that is a week old or more. Keep it at room temperature on the kitchen counter and don't try to clabber it in the refrigerator. Be prepared for a long wait if attempting to clabber extremely fresh, raw milk. It can take quite some time, maybe even a week or more for the curds and whey to separate. If all you have is fresh raw milk to clabber and you don't have time to wait, try adding a few drops of lemon juice or a tablespoon of plain yogurt to the milk, shake it up and leave it on the counter. This should speed up the process of making clabbered milk considerably.

If you do not have access to raw milk then plain whole milk yogurt from the store is the easiest to use. Simply strain the yogurt using a dishtowel or cheesecloth. Fill the dishtowel or cheesecloth with the yogurt and hang it above a bowl to catch the liquid whey. Liquid whey will last in a glass mason jar in the refrigerator for about six months, although the flavor will grow stronger and more pungent over time.

Containers For Fermenting

(www.culturesforhealth.com) There is no shortage of options when it comes to choosing a container for fermenting your vegetables, fruits, or condiments.

Fermenting vessels range from wide-mouth glass jars to ceramic crocks. What you use ultimately depends on what vegetable you're fermenting and your personal preferences, but here are some things to keep in mind when choosing a container.

Glass is one of the best options for fermenting vegetables because it doesn't scratch easily, nor does it contain chemicals such as BPA. Glass containers such as canning jars are relatively easy and inexpensive to obtain. At Cultures For Health our Fermented Vegetable Master Kits are made of glass and come in half-gallon and gallon sizes.

Ceramic fermentation crocks are fairly common and are a good choice for making large batches of fermented vegetables. German fermenting crocks range from 5-20 liters in size and you can often find them at local farm supply stores or from local potters.

Food-grade porcelain is generally safe for fermenting vegetables. Be sure to avoid porcelain pieces such as vases or decorative pottery that are not food grade.

Although technically plastic can be used for fermentation, it is not recommended for several reasons. First, plastic can be damaged, and scratches in the plastic can harbor foreign bacteria. Second, plastic (even food-grade plastic) often contains undesirable chemicals that can affect the vegetables.

Lids and Airlocks

(www.culturesforhealth.com) Using a jar with an airlock in the lid is a popular option for fermenting vegetables, and many designs are available. For use with wide-mouth canning jars, Pickle Pipes and the Perfect Pickler are great choices! Wide-mouth canning jars come in a range of sizes, from half-pint to half-gallon. The Pickle Pipe attaches snugly under the ring of the jar. Using a jar with an airlock in the lid is a popular option for fermenting vegetables, and many designs are available. For larger batches, a half-gallon or gallon-size Fermented Vegetable Master can be used. These glass jars come complete with airlock lid, storage lid, and ceramic fermentation weights. Fermenting vegetables with an airlock lid greatly reduce the chance of mold or kahm yeast formation, no burping required!

Using a canning jar or other glass jar with its lid tightly closed is another option when fermenting vegetables. The advantage to using a tightly-sealed lid is that exposure to oxygen is reduced, so the chance of mold or kahm yeast forming on the surface is reduced. A disadvantage is that the jar requires more attention. When using a tight lid, you'll need to

burp the fermenting jar daily. As vegetables ferment, carbon dioxide can build up. You'll need to burp the jar to release excess pressure and avoid overflow or explosions.

For smaller jars, a paper coffee filter secured with a tight rubber band or canning lid ring works well to keep pests out and allow fermentation gases to escape. For small or large containers, a tight-weave dishtowel or butter muslin, secured with a rubber band is sufficient as well. One advantage of using a cloth cover is that it is easy to peek in or sneak a taste of the fermenting vegetables at any point. The disadvantage is that mold or kahm yeast forms more often on the surface of the vegetables. This surface formation is usually harmless and can be removed and discarded.

Even when using a lid with airlock, keeping the vegetables submerged under the brine during fermentation is important to help reduce exposure to oxygen. To keep your vegetables submerged, you can use any object that is clean and free of glues or other chemical coatings that might contaminate your fermenting veggies. Objects such as fermentation weights, glass jars, or plastic bags filled with water work well. Ball has a Fermentation lid and Spring combination that works well.

Old style fido or wire bale jars with their own gaskets are a convenient choice for fermenting. When the pressure increases high enough the fido jars will vent themselves.

Pounding Tool

(www.culturesforhealth.com) If you're fermenting sauerkraut or other vegetables that ferment in their own juices, you will need some sort of pounding tool to help break apart the vegetables and compress them together in the fermenting vessel. Both the Cabbage Crusher and Pickle Packer work well for this as they are dual sided to work with multiple sized jars.

Fermented Potatoes

- 4 cups cooked, peeled, organic, Yukon Gold *or* sweet potatoes
- 2 cups plain yogurt or kefir
- 1 Tbsp sea salt
- 6-12 sprigs fresh dill (optional)

Bake or boil potatoes and then mash them in a large glass bowl. Do not microwave. With a handheld mixer or food processor, blend well with dill, yogurt and sea salt. Cover with a clean, cotton cloth and secure with a rubber band. Leave the covered bowl on the counter for 2 days and then refrigerate.

Fermented potatoes will last about a month in the refrigerator. Serve fermented potatoes with steak as an enzyme rich side dish or with any meal where potatoes work well. Fermented potatoes may be slightly warmed on the stove before serving, but take care not to warm them too much or enzymes and probiotics will be lost.

Fermented Green Beans with Cayenne Peppers and Garlic

- ½ cup salt
- 1 gallon filtered water
- 2 lbs. fresh green beans, washed
- Grape or mesquite leaves
- 6-12 cayenne peppers, washed and tops removed
- 6-12 sprigs fresh dill
- ½ cup black peppercorns, crushed coarse
- 8 cloves fresh garlic, peeled and quartered
- ¾ cup raw apple cider vinegar

Make a brine by **dissolving** the sea salt in water. **Cut** the ends off green beans. **Measure** them by the jars and cut them to fit in lengthwise, with 1 inch of headspace at the top. **Place** ½ of one grape leaf or a few mesquite leaves into the bottom of each of 6 quart-size jars. **Fill** jars with green beans, **tightly packing** them into the jar. **Use** a butter knife to **gently slide** in 1-2 cayenne peppers per jar. **Do the same** for the dill sprigs, 1-2 per jar. **Add** 1-2 tablespoons crushed peppercorns atop the green beans, followed by 2-3 garlic pieces.

Pour 2 Tbsp. of apple cider vinegar into each jar, then **fill** with brine solution, leaving 1 inch headspace at the top. If necessary, **weigh** the beans down under the brine. **Cover** each jar with a tight lid, airlock lid, or coffee filter secured with a rubber band.

Culture at **room temperature** (**60-70°F** is preferred) until desired flavor and texture are achieved. If using tight lids, **burp** daily to release excess pressure. Once the beans are finished, **put** a tight lid on each jar and **move** to cold storage. The flavor will continue to develop as beans age.

Fermented Sauerkraut and Other Vegetables

Cabbage is the basic ingredient used in sauerkraut but other vegetables, fruits, and spices can be added as well. Common combinations include carrots, apples, and garlic. Caraway seeds can be added at a rate of 1 tablespoon per quart of sauerkraut.

Core and shred the cabbage. Put aside a few outer leaves to top off the jar. Salt the cabbage mixed with whatever additional ingredients you have chosen using 3 tablespoons of salt per 5 pounds of mixture. A little more or a little less salt can be used. The idea is to use enough salt to prevent mold, but not so much that you prevent the fermentation process. Five pounds of cabbage will usually fill two quart jars.

Press cabbage into a straight-sided container. Work a layer at a time. Use your fist or a tamper to get the air out and bruise the cabbage to help it release juice.

Cover with reserved whole outer leaves. Grape leaves can be used and will keep the cabbage crisper. In either case it helps keep shredded bits from floating up. Apply a weight on top of the leaves. Use an airlock or cover with a towel to keep out dust.

Salt pulls the juice out of the cabbage, and thus makes its own brine. There should be enough

brine to completely cover the cabbage. If necessary top off with a weak brine (2 tablespoons of salt in 8 cups water). It is important that no air gets to the vegetables. The process is anaerobic.

Set out on the counter for 4 or 5 days then taste. The sour taste will increase as it is left out at room temperature. The taste seems to be ideal after 1 to 2 weeks depending on the temperature. The warmer the temperature of your kitchen the faster it will ferment.

Keep an eye on the kraut. Skim off any froth or white film from the top every 2 to 3 days. The white film is not mold; it is kahm yeast. An airlock will limit its formation. It is not harmful, but does not enhance the flavor. The froth is simply the results of the process whereby carbon dioxide is being produced.

When it is finished, store in a cool cellar or in the refrigerator.

Other vegetables usually do not have enough juice to make their own brine like cabbage, but they can be brined by the same method. Slice, pack tightly, cover with a medium brine (4 tablespoons of salt in 8 cups of water) and weigh down. Carrots, radishes, turnips, cauliflower, broccoli, peppers, onions, and celery or combinations of these vegetables can be done using this method.

Cultured Berries

- 2 cups of fresh berries (You can use blueberries, boysenberries, raspberries, blackberries, or a mixture. Strawberries are too acidic for lacto-fermentation and do not ferment well. Frozen berries can be used.)
- 2 tablespoons of honey
- ¼ teaspoon salt
- 2 tablespoons whey
- 2-3 tablespoons water

Put the berries into a 1 pint jar pressing down as you go to pack them in the jar. Leave about 1 inch space at the top of the jar. Mix the honey, salt, whey, and water in a measuring cup. Pour slowly into the jar and again leave 1 inch headspace at the top of the jar. Using a wooden spoon or clean hand press down gently on the berries. Add more water if necessary. The berries must be under the water for them to properly ferment.

Weigh down the fruit and place the lid or airlock on the jar. Place the jar on a tray or plate in case juices bubble out of the top. Let set at room temperature for 24-48 hours. Do not leave at room temperature for more than 48 hours or the sugars will start to turn into alcohol.

Berries are finished fermenting when you see bubbles and when they taste slightly sour with a bit of a carbonated feeling. Put the lid back on and store in the refrigerator for up to 2 months.

Fermented Apples

Fermented apples can be made the same way as cultured berries (see above) using the ingredients below. Fermentation is complete in 24-48 hours.

- 4 cups of apples, chopped
- 1 teaspoon salt
- ½ teaspoon whey
- Water to fill container leaving 1 inch headspace at the top
- Optional ingredients include half an orange peel, half a lemon peel, one cinnamon stick, a teaspoon of cloves, a few leaves of fresh mint, a few sprigs of fresh rosemary, vanilla beans, nuts, seeds, dried fruit, sprouted almonds, sprouted walnuts, dates, and raisins.

Fermented Mango Chutney Recipe

- 3 cups ripe mango peeled and cubed, preferably from a local farmer's market
- 1 Tbsp freshly grated ginger
- 1 red pepper, seeded and cut into small pieces
- 1 small onion, chopped
- 1 jalapeno chili, seeded and chopped (optional)
- 1/2 cup fresh mint leaves, chopped
- 1/2 bunch cilantro, chopped
- 1/8 cup sucanat (dried sugar cane juice) or honey
- 1/2 cup fresh lime juice
- 2 tsp sea salt
- 1/4 cup liquid whey
- 1/2 cup filtered water

Mix mango, ginger, peppers, onion, mint and cilantro in a large glass bowl. Press down lightly with a meat hammer or other kitchen pounder. Mix remaining ingredients well and pour over ingredients in the bowl. Transfer to a quart and pint size mason jars leaving at least an inch at the top. Leave on the counter for 2 days and then transfer to the refrigerator. Use up within about 2 months. Feel free to substitute papaya for the mango if desired.

This is a little "Cheat Sheet" we use. It is taped to the inside of a kitchen cabinet door.

Ferment Brine - 8 cups water
Cabbage - 2 Tbsp salt
Other vegetables - 4 Tbsp salt
Cucumbers - 6 Tbsp salt
Zucchini - 6 Tbsp salt

Econolock

Fido Jars

Perfect Pickler

Pickle Pipe

Fermentation Weights

Ball Fermentation Lid and Spring

Fermenting Airlock Lid