FEARLESS FERMENTING

How to Boldly Craft Fermented Foods Which Nourish Your Body, Heal Your Gut, and Feed Your Soul

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NINE WILD VEGGIE FERMENTS, PART I PICKLES

FERMENTATION VERSUS PICKLING

There are many food preservation techniques: fermentation, salt curing, quick pickling, and water bath canning, to name a few. But pickling and other techniques do not contain the same nutritional profile as fermentation does. Here are the differences between quick pickling (i.e., using vinegar to create a shelf-stable product) and fermentation:

	Fermentation	Quick Pickling
Preserving liquid	Brine → lactic acid	Vinegar
Environment	Clean	Sterile
Probiotic?	Yes	No (kills all microbes)
Adds nutrients?	Yes	No
Speed	Slow	Fast
Flavor	Complex	One-note
Shelf-stable?	No	Yes

Preserving Liquid

Fermentation generates organic acids, transforming simple salt brine into lactic acid, acetic acid, citric acid, etc. Quick pickling uses already-fermented vinegar (a.k.a. acetic acid), but it's distilled and zapped of any probiotics. This makes it inherently shelf-stable compared to fermented foods.

Environment

With fermentation, it's a good idea to practice good hygiene: keep your hands, vessels, and utensils free of dirt and wash them in warm soapy water. With a few exceptions (such as finicky spore-based ferments like koji and tempeh), the environment does not need to be sterile. The strategy of fermentation is to grow beneficial bacteria. They will then ensure that other microbes don't join the party by creating an environment that favors beneficial bacteria and their allies.

Quick pickling, by comparison, requires much more diligence in preparing the environment because the strategy is to banish *all* microbes, whether friend or foe. Thus the need to boil jars and utensils, handle things with tongs, wear hazmat suits, etc. (Okay, I'm exaggerating on that last one.) With respect to the environment, fermentation is more forgiving, which is great for lazy guys like me. I don't like doing dishes, and I sure as heck don't want to have to work in a clean room!

Probiotic/Nutrient Content

Fermentation adds many nutrients to food, including probiotics (living good bacteria) and postbiotics (p. 36) like vitamins, digestive enzymes, bacteriocins, amino acids, and more.

Quick pickling, in contrast, adds no nutrients to the food. The strategy is to halt all microbial processes, both bad and good. The end result is that you have the nutritional value of the ingredients but nothing more.

Speed

Depending on the room temperature (and for some ferments, the relative humidity), it generally takes at least a few days for bacterial succession to occur in fermentation. A basic pickle, for example, takes about 10 days on average. Quick pickling is much more speedy—it's done as soon as everything cools and the jars seal.

The speed at which fermentation proceeds is dependent on the ambient temperature. Like other life forms, fermentation goes faster when it's warmer, and slower when it's cooler. Practically, that means you may want to adjust the fermentation time of a particular recipe based on the season.

Flavor

Compared to quick-pickled foods, fermented foods generally have more layers of flavors and nuances. Typically, as the bacterial parade progresses in a jar of fermented food, each player leaves behind unique metabolites, thus adding a complexity of flavors. I compare the flavor of a fermented food to that of a fine wine: a quick pickle is like "Two Buck Chuck" at Trader Joe's. Quick pickles have their place. I appreciate a well-made bread-and-butter pickle, for example. It's hard to replicate a sweet brine using only fermentation, although I have come close with my Beet 'n' Sour pickle recipe (p. 87).

Shelf Stability

Despite all of their benefits, fermented foods are not *inherently* shelf-stable the way a well-made, unopened jar of quick-pickled pickles is. Because we're working with a living ecosystem, when we ferment food, it's constantly growing, breathing, evolving, and dying. It is difficult to keep all the benefits of such an ecosystem in a hermetically sealed environment. Anyone who has experienced the results of keeping a too-tight lid on a jar of kimchi or left a bottle of kombucha sit at room temperature for too long can attest to the fact that a ferment can be explosive and in rare cases, downright dangerous! Fortunately, simply storing ferments in the refrigerator effectively makes them shelf stable.

Sourcing Ingredients: Buy S.O.L. (Seasonal, Organic, and Local)!

Always buy the highest-quality ingredients you can afford in order to ensure success. In order of what's the best-quality produce, your own garden-grown produce is always best, followed by produce grown locally and regeneratively by farmers in your community, produce grown organically and found at your farmers' market, produce grown organically and found at the supermarket, and finally, produce grown conventionally and purchased from a supermarket.

Fermenting food *grown locally and with the seasons* is important because the microbes present on a vegetable co-evolved with it to grow in a specific season. That means preserving food when it's at its freshest peak ensures the best chance of success.

That said, you can also have great success with older, less fresh, or gleaned produce. The strategy is to preserve the nutrition before it decomposes, and even produce that's on the tail end of freshness will ferment well.

CUCUMBER VARIETIES

You can create pickles from just about any cucumber variety, but some are more ideal than others.

There are (at least) two broad categories of cucumbers and some heirloom varieties that don't fit neatly into either of those two categories.

Pickling Cucumbers

Certain cucumber varieties have been bred over the ages to lend themselves well to preservation by pickling. Characteristics favorable to pickling are pickles that are a medium size (i.e., they can fit into a pickle jar) and have a skin that's thick enough to stay crisp while letting the right amount of brine permeate it. Classic picklers usually have small bumps on them, contain just the right amount of small-sized seeds that can be easily swallowed, and contain an ideal amount of water to make a firm pickle.

Note that if you allow pickling cucumbers to grow beyond their usual size, they can lose some of the qualities that make them ideal. For example, the skin will thicken eventually and the seeds will grow and may be noticeable when eating. You can always treat larger specimens like you would slicing cucumbers. Also, most cucumbers increase in bitterness as they grow in size.

- Kirby cucumbers are the classic pickling cucumber. They're also simply known as "pickling cucumbers." They're usually harvested at 3 to 6 inches (7.5 to 15 cm) long and up to 1 inch (3 cm) or so in diameter.
- Salt and Pepper is a relatively new variety with the same size and shape as a green Kirby. These cucumbers have been bred to have a yellow skin with black bumps. (Thus the name Salt and Pepper.) I've used these for pickling and they work well, the same as with other Kirby varieties.
- Korean cucumbers have the girth and bumps of a Kirby but tend to be much longer at 12 to 18 inches (25 to 40 cm)! I found them last summer at my favorite Korean market. They make decent pickles, although I prefer to pickle cucumbers whole and slice them post fermentation. Because of their length, Korean cucumbers don't lend themselves to pickling whole unless you're using a tall fermenting vessel like a large crock. I prefer to use Korean cucumbers when making *oi sobagi* (p. 136), which are stuffed kimchi pickles.
- Japanese cucumbers have traits of both slicers and picklers and are commonly pickled in Japanese cuisine. They're 6 to 12 inches (15 to 30 cm) long and 1 to 2 inches (3 to 5 cm) in diameter and have grooves along their length. They don't contain many seeds.

Slicing Variety Cucumbers

Certain varieties of cucumbers lend themselves to slicing rather than pickling. This is a broad classification of cucumbers based on their size. Slicers are usually longer and thicker in diameter than picklers, and they usually have a smoother skin. They have few seeds (but the ones present may be larger) and are more watery. As the name implies, slicers are better for slicing and eating fresh than they are for pickling. I don't recommend using these varieties for fermented pickles, but if that's all you have, you can still make a great pickle.

- Persian cucumbers are thin-skinned and usually grooved along their length, averaging about 6 inches (15 cm) in length. They're thinner in diameter than pickling cucumbers are—they're usually not thicker than 1 inch (3 cm). Persian cukes are best eaten fresh, but in a pinch, I've used these to make kimchi pickles.
- English cucumbers are the classic slicer, at 8 to 10 inches (20 to 25 cm) long and about 2 inches (5 cm) in diameter. But beware! Sellers often add a layer of wax to these cukes. This wax makes it difficult to pickle them.

Varieties I Don't Recommend Pickling

- Mexican sour gherkins are too thick-skinned to pickle well, although they are an adorable 1 inch (2 cm) long and resemble watermelons.
- West Indian spiked gherkins have a skin-to-flesh ratio that isn't favorable for pickling. Their spiky skin also doesn't taste particularly good after pickling.
- Lemon cucumbers (and other round varieties) just don't pickle well. I speculate that's because their spherical shape doesn't pickle evenly, nor does it create a pickle that slices well without "spilling its guts," so to speak.

VEGETABLE BRINE FUNDAMENTALS

From thousands of years of experience, humans have found a briny sweet spot (or rather, a salty spot) range for fermenting pickles that balances the flavor and still protects the ferment. For most veggies, the ideal range is between 2 and 5% by weight (expressed as a percentage of the weight of salt to the weight to water). The *volume* of salt can vary by how coarsely or finely it's ground. A tablespoon of coarse salt crystals will weigh less than a tablespoon of finely ground crystals, for example. That's why it is always better to use *weight* than volume when measuring ingredients such as salt and for making brine.

Whenever salt is listed as an ingredient to make brine throughout this book, you'll see a reference to the brine strength ("to make a 5% brine", for example). Keep in mind that this will always mean by weight.

Here is a quick reference chart to make brine using fine sea salt, if you haven't had the chance to purchase a digital kitchen scale yet:

For a brine strength of	Use this much fine sea salt in 2 cups (500 ml) water
2%	2 tsp (10 g)
3%	1 tbsp (15 g)
4%	4 tsp (20 g)
5%	5 tsp (25 g)

You should never use a brine of less than 2% strength when pickling. At such a low level, some of the undesirable microbes can survive and make trouble in your ferment. My go-to brine percentage for cucumber and most whole vegetable pickles is 5%.

I'm used to the flavor, texture, and fermentation time at that brine strength in my climate. Feel free to experiment with different brine strengths and note how each one affects these variables.

You could certainly make a brine stronger than 5%. That will create a more protective effect, but it will also slow down fermentation. Conveniently, you could use this fact to purposely alter the length of fermentation. For example, if you want to plan a longer cucumber pickle fermentation (let's say 21 days instead of 10), you could use an 8 or 9% brine. It would take longer for the microbes to ferment in the saltier brine than it would at half that strength. (There are scant scientific studies about this specifically, but anecdotally, this has

LET'S GET NERDY

If you're in a scientific or other technical field that requires expert precision, you may have noticed that the layperson's way of calculating brine strength is not technically precise. If you want to make a liter (1000 ml, a little over a quart) of brine at 5%, most folks would simply weigh 1000 g water or ml and 50 g salt. (Note that grams and milliliters are interchangeable when measuring water.) This makes a brine that weighs 1050 g in total. But that means that the *actual* percentage of brine is:

$$\frac{\text{50 grams salt}}{\text{1050 grams total brine weight}} = 4.76\%$$

This final percentage of 4.76% is clearly slightly weaker than 5%. However, in most fermented food applications, this discrepancy is not important. However, if you want to be technically precise with your brine, follow these steps:

1. **Calculate the total amount of brine needed for your ferment (1000 ml or 1 liter).**
2. **Find the weight of salt based on your desired brine strength (5% = 50 g).**
3. **Subtract the weight of salt from the amount of water to get the actual amount of water to use (950 g).**
4. **Mix the salt and water together until the salt dissolves.**

been my experience.) Conversely, if I want a "quicker" fermented pickle—an oxymoron, I know—I'll make a weaker brine of usually 3%.

It should be noted that if you're using a brine stronger than 10%, the osmotic pressure of the salt will actually begin to dehydrate the veggies even though they're submerged in liquid. Also, pickles fermented at higher salt concentrations will obviously taste saltier. If you wish to reduce some of the saltiness of a pickle post pickling, quickly rinse it or soak it in fresh filtered water for a few minutes.

WHICH VEGGIES CAN BE PICKLED?

It would almost be simpler to list the vegetables that *don't* take well to a pickling process of some sort. Brassicas (cabbage, cauliflower, broccoli, Brussels sprouts, radishes), most root veggies like beets and carrots, pole or wax beans, squash (cucumbers), nightshades (tomatoes, eggplant, peppers) all take well to various kinds of pickling.

Soft and delicate plants like lettuces and cilantro tend to turn into mush when fermenting. I've also tried fermenting kale in a kimchi, and it did not turn out well—it was far too bitter. (I later sprinkled kale in with cabbage in a kimchi, which tasted much better.) A good rule of thumb is that if you would normally cook it, then it likely could stand up to a pickling.

Summer squash varieties like zucchini, yellow squash, eight ball squash, etc. tend to be too watery to create a crispy, crunchy pickle. Instead, use those to make zoodles or slice them lengthwise and grill 'em up!

Tomatoes can be pickled, usually when green or unripe. You could also pickle whole cherry or grape-sized tomatoes. But tomatoes are more often pasted or cooked and then canned into sauce.

PICKLING PREPARATION

Backslopping

This term, which is just fun to say aloud, means to add a small amount of microbially rich liquid to a new ferment. This is a great insurance policy for ensuring a proper fermentation. Think of it as a way to *fertilize future ferments*. Typically, backslop is brine that's left from a previously fermented batch of the same recipe, but it need not be the

exact one. (The probiotics are what we're after when we backslop.) Many fermenters report that using backslop also helps keep batches consistent, so if you created an outstanding pickle and want to replicate it, know that backslopping can help you achieve consistent results from batch to batch. One tablespoon (15 ml) of liquid per quart/liter of whatever you're fermenting is all you need to inoculate your new batch.

When saving brine you're going to use as backslop, be sure to strain out any solid bits of veggies—those can attract mold. Use the finest straining device you have. The finer the filter, the clearer the liquid will be. (Note that it will still appear cloudy in most cases.) For best results, store the backslopped brine in a tightly sealed bottle in the refrigerator. You can also to store it at room temperature if needed.

You might notice that backslopping and culturing are quite similar. In both, you're inoculating a large amount of substrate with a smaller microbially rich substance. The difference between the two is that backslopping captures a cross section of all the microbes from a particular batch—it's terroir, essentially. Culturing is done typically with a purer (or at least more well known) set of microbes.

Liquids that can be used for backslop:

- Pickle brine from any style of fermented pickles, not just cucumbers
- Sauerkraut brine
- Liquid whey from making cultured milk ferments
- Water kefir (especially unflavored)
- Mature kombucha (unflavored)
- Beet kvass
- Raw apple cider vinegar
- Olive brine (if olives were fermented rather than simply cured or lye-processed)
- Milk kefir (could be diluted)
- Kimchi brine (be careful using this, as the intense flavors of the kimchi brine may affect the flavor of what you're backslopping)

Does adding backslop make a ferment go faster? Possibly, but to me, that misses the point. Fermentation happens at the speed of Nature, and this exquisitely honed microbial dance has been working well for many thousands of years. There's usually no need to tinker with it. Are there times when you simply need to have something ferment more quickly or by a deadline? There have been close calls when I've taught workshops and didn't time the beginning of a ferment properly, causing it to not be quite ready by the time of the workshop. (Fermenters' problems, am I right?) For the vast majority of us, however, speed is not a virtue when it comes to fermentation. Also keep in mind that in 99% of the ferments I have made *without* using backslop, the results have still been great.

Add a Tannin-Rich Tree Leaf to the Jar

Tannins are astringent organic acids found in certain plants—they're used as a chemical defense by the plants against predators. By adding tannin-rich leaves to a pickle, the cell walls of the produce you're fermenting will tend to stay firmer, which translates to a crispier pickle. Grape, fig, and most stone fruits and pomes (such as apples and pears) all contain tannins throughout the plant, including in their leaves. Add a leaf or two to each batch, and you'll almost always have crunchy results. In a pinch, you can also use black tea leaves.

Keep Them Whole

Fruits like cucumbers are quite watery and delicate, a complement to and perfect reflection of summer's heat. I find it's best to ferment cucumbers whole. If you need to slice or chop them, you can do so right before serving. Of course, if you ferment some of the larger cuke varieties, you almost have to slice them first to fit them into your vessel. When I have fermented sliced cucumbers, they tend to get soggy sooner than they would if I'd kept them whole.

Pack 'Em In, Weigh 'Em Down

Cucumbers give up about 10 to 15% of their water during fermentation, causing them to shrink slightly. If you're fermenting in a jar, is important to pack the jar very tightly so that they won't float to the surface as they give up some of their water. Thus, you should add weight(s) on top of the contents to keep them under the brine (p. 52).

TROUBLESHOOTING PICKLES

Surface Scum

First of all, yeasts and molds are normal. Fermented vegetables are usually exposed to air for at least some of the time during their ferment, and air contains airborne yeasts and mold spores. Yeasts are also present on the surfaces of most fruits and vegetables. All of that means it's common for the surface of a pickle vessel to pick up yeast and also occasionally mold.

Kahm yeast (as it's known in the fermenting world) is a surface scum that looks ropy and a bit dry. It may trap gas bubbles. Often, its look reminds me of the surface of the moon. It's harmless, but it doesn't taste very good and it doesn't add to the charm of the ferment. Although it may form a complete sheet that covers the surface of the ferment, it won't usually stick together—instead, it breaks up like algae on a pond.

While relatively common, mold should be handled carefully. Mold is usually colored green, black, or other bright colors and will look dry—it may even appear powdery. Mold will sit on top of the brine layer. It can contain lighter-than-air spores that are easily disturbed, so be careful when handling vessels where mold has formed.

To remove yeast and mold, carefully wipe, scrape, or scoop out the visible scum that forms on top. Sometimes the yeast or mold forms a single layer called a pellicle that can make it simpler to remove. When I get mold, I place the whole vessel in the kitchen sink and gently remove any moldy layers, being mindful not to blow the spores around too much. Then it's easy to dispose of the moldy layer down the sink drain.

Kahm yeast has formed on top of fermenting beet kvass.

If you encounter mold frequently when you're making pickles, your fermentation environment is probably on the warmer side. Try to find a slightly cooler environment for the next batch to see if that reduces mold formation. If you're sensitive to mold and you observe mold with spores on your ferment, it may be best to carefully toss the whole thing.

When cleaning the surface, you won't get every last yeast cell or spore, but do your best to clean the surface nonetheless. Then give the brine a stir. Any residual yeast cells will quickly succumb to the acidic environment of the brine.

The surface mold rule does *not* apply to kombucha! **Moldy kombucha can make you sick!** If there's *any* sign of mold on your kombucha, throw it out and start over! Read more about that in the troubleshooting section of the kombucha chapter (p. 188).

Mushy Cucumber Pickles

There are several reasons why your pickles may not come out perfectly crispy and crunchy. Here are the most common reasons I have encountered:

- Some pickles were sticking above brine during fermentation and were exposed to the air.
- There were cucumber flower parts that made their way into the brine. The flowering parts contain enzymes that are known to make pickles mushy. Be sure to remove any flower ends before adding your cukes to the jar. I just scrape the bloom ends with my finger.
- You didn't add a tannin-rich leaf to the jar during fermentation (p. 78).
- Used something other than a "pickling" cucumber variety. Slicing cucumber varieties have a high water content, making them more susceptible to becoming mushy during fermentation.
- Your pickles sat in brine too long. Even in the refrigerator, pickles will eventually get soft. I notice it takes about 2 to 3 months for this to happen.
- The pickles over-fermented.

The solution in most cases is to fix the underlying cause for future batches. Not much can be done once a pickle has become soggy or mushy. They can be chopped and turned into relish (p. 151), or incorporated or blended into other recipes like vegetable soups.

Hollow Pickles

Hollow cucumber pickles are a common outcome. The membrane holding the seeds "disappears" or rather dissolves during fermentation. Typically, it means that the cucumbers were picked and sat around a while (usually a week or longer). But that's not always the case—other factors may be involved. I haven't found a reliable pattern to determine when a pickle can become hollow. They're perfectly fine to eat, but they may not be as satisfying to the pickle perfectionist.

Slimy Brine

Sometimes your brine may appear slimy—it may be thicker than normal water and maybe a bit cloudy. However, that slimy aspect won't affect the taste or texture of your pickles.

The "slime" is made of viscous polysaccharides (dextrans) produced by *Leuconostoc* bacteria (remember, they're part of the "relay race"). These substances are quite useful in the biochemical and pharmaceutical industries, but they don't produce a desirable mouthfeel in your sauerkraut. But don't fret! As the *Leuconostoc* subside and are overtaken by *Lactobacillus*, the slime will naturally go away because the *Lactobacillus* will digest it. I was fine when I ate pickles when they were in that "slimy" stage and I haven't noticed a difference in taste.[14]

STORING YOUR PICKLES: THE FRIDGE IS YOUR FRIEND

The refrigerator is a marvelous invention, a time machine of sorts! It allows us to effectively make fermented foods shelf stable. The temperature range of a home refrigerator is 40°F / 4°C, and that slows down fermentation activity significantly without killing the microbes. In fact, if you remove an already-fermented jar of food from the fridge and let it sit at room temperature for a few days, it will simply resume fermentation (assuming there's still enough food for the microbes).

Austin Says: "The refrigerator acts as a super-slow-mo button for fermented foods, effectively making them shelf-stable."

Once your pickles are finished (and remember, that's up to you, as you may prefer your pickles crispier and less sour or very sour), do one final wipe, scrape, and scoop of the surface of the brine. Remove any weights and airlock devices and put a tightly closing lid on the jar before you store it. Most fermented cucumbers and other pickles will be good for up to 2 months (possibly longer) when refrigerated.

GARLIC CUCUMBER DILL PICKLES

Preparation Time: 10 minutes	Yield: 2 quarts (2 liters)	Fermentation Time: 5–10 days

FERMATRIX SCORE 9

INGREDIENTS

- 2 to 3 lb (1.5 kg) pickling cucumbers
- 6 sprigs fresh dill
- 4 to 8 cloves garlic
- 6 inches (15 cm) fresh horseradish root, optional
- 1 tbsp (5 g) mixed peppercorns
- 3 tbsp (45 g) fine sea salt (to make a 5 to 7% brine)
- 2 tbsp (30 ml) liquid whey or pickle brine, optional
- 1 grape leaf or other tannin-rich tree leaf such as fig, apple, peach, apricot, or laurel (bay leaf)

INSTRUCTIONS

Prepare Vegetables

1. Scrape the tip off the flower end of the cucumbers to ensure that there are no flowering parts still attached to the cucumber. (Enzymes and molds found in the flowering parts can make pickles mushy.) Rinse off any dirt. If using you're slicing cukes, slice them into ¾ inch-thick pieces. If you're using a pickling variety, leave them whole.
2. To a clean half-gallon (2 liter) or larger glass jar or ceramic crock, add 2 garlic cloves, peppercorns, and 2 dill sprigs.
3. Add tannin-rich leaf to jar.
4. Add half of the cucumbers. Pack them into the jar as tightly as you can.
5. Crush 1 garlic clove and a few more dill sprigs to the jar.
6. If using, slice the horseradish 1 inch (2.5 cm) pieces and add to jar.

7. Add the remaining cucumbers, garlic cloves, and last few dill sprigs.
8. Add sea salt to 1 quart (1 liter) filtered water and stir until the salt dissolves.
9. Add liquid whey or pickle brine from a previous batch to the container.
10. Pack the jar or container tightly. Place weight(s) on top of contents. If using jars, leave at least 1 inch (2.5 cm) of head space from the contents and the top lip of the container with the weights applied.
11. Slowly pour brine into the jar until the contents are completely covered.
12. Cover the container with a tea towel or dishcloth to keep out dust and flies. Secure the cloth with twist ties or a rubber band. If you're using a small-batch fermentation kit, apply the fermentation lid per the instructions.

Ferment

1. Place in a cool, dark spot in your house, at least out of direct sunlight. Taste the pickles after 5 days. If they still have the texture closer to a raw cuke—let them ferment for a few more days.
2. When you like the taste and texture of your pickles, remove any weights and airlocks from the container(s).
3. Clean the top surface of yeasts and molds if needed (see p. 79).
4. Transfer the contents to jars with standard lids (not the airlock lids) and store in the refrigerator. Pickles will last at least a few months in the fridge.

NO-NUKES 3-PEPPER CUKES

Preparation Time: 10 minutes	Yield: 1 quart (1 liter)	Fermentation Time: 5–14 days

FERMATRIX SCORE 8

INGREDIENTS

- 2 fresh jalapeño peppers
- 1 large grape leaf or other fruit tree leaf
- 1/2 tsp (2.5 g) cayenne pepper powder
- 1/2 tsp (2.5 g) Anaheim (a.k.a. California) chili pepper powder
- 3 to 4 tsp (15 to 20 g) fine sea salt (4.5 to 6.8% brine by weight)
- 1 1/2 lb (700 g) pickling cucumbers
- 1 tbsp (15 ml) pickle brine, optional

INSTRUCTIONS

Use the same technique as with the garlic dill cucumbers, but with the following changes:

1. Cut the stems off the jalapeños, then slice them lengthwise in half. For more heat, leave the seeds and membranes intact. For less heat, scrape them out, leaving only the green fleshy part.
2. Add the fruit leaf, sliced peppers, and pepper powder to your jar before adding the cucumbers and brine.

SWEET PICKLES

In the pantheon of pickledom, must they *all* be sours? Is there any room for a bread-and-butter sweet pickle or at least a respectable fermented version?

The internet and cookbooks abound with quick-pickle recipes that are sweet. These are made with a brine of water, vinegar, and sugar. Sugar tends to naturally attract yeasts, which then consume it and burp out carbon dioxide and ethanol. I didn't want to simply replicate the typical commercial brine formula for fermentation purposes—that would likely result in somewhat boozy pickles.

And so I took it upon myself to find a naturally sweetened cucumber pickle. I had been making beet kvass and had noticed that it tasted naturally sweet. (Which wasn't surprising seeing as beet roots contain about 60% sugar.) Eureka! The "beet 'n' sour" (or "bread and "beet-er"?) was born. Would it fool you into thinking that you're eating a true sweet pickle? No, but the color of a beet 'n' sour pickle is beautiful and mesmerizing *and* it's naturally sweeter than a sour pickle.

BEET 'N' SOUR SWEET CUCUMBER PICKLES

Preparation Time: 10 minutes	Yield: 1 quart (1 liter)	Fermentation Time: 5–14 days

FERMATRIX SCORE 9

INGREDIENTS

- 1 1/2 lb (700 g) pickling cucumbers
- 1/4 of a medium beet root
- 1 1/2 tsp (7.5 g) yellow mustard seeds
- 1 1/2 tsp (7.5 g) black mustard seeds
- 1 tsp (5 ml) celery seeds
- 3 to 4 tsp (15 to 20 g) fine sea salt (to make a 5 to 7% brine)
- 1 tbsp (15 ml) pickle brine, optional
- 1 large grape leaf or other fruit tree leaf

INSTRUCTIONS

Use the same technique as with the garlic dill cucumbers, but with the following changes:

1. Slice the beet and cut slices into thin strips. Add the beet, mustard seeds, and celery seed to the jar first.

FERMENTED VEGETABLE MEDLEYS

Up to now, we've focused on single-vegetable ferments. That's only the beginning! By chopping up and mixing many different vegetables, you can make a wonderful, long-lasting, delicious, naturally fermented vegetable medley. A few of my favorite combinations are classics: Latin-inspired *escabeche* (a.k.a. taco bar veggies) and *giardiniera* (a mix of pickled veggies common in Italian antipasto).

Try out different combinations! Generally, I chop the pieces into similar sizes, specifically pieces that could be eaten in one bite. Certain veggies such as carrots, cauliflower, and beets are more dense than others, like peppers, onions, or herbs. Mixing vegetables with differing densities may result in the mixture having different levels of crunchiness, because more dense veggies are firmer and take longer time to soften than more watery, less dense vegetables.

GIARDINIERA

Preparation Time: 15 minutes	Yield: 2 quarts (2 liters)	Fermentation Time: 10–14 days

FERMATRIX SCORE 10

This is a classic Italian version of chopped and pickled veggies.

INGREDIENTS

- 1 lb (500 g) sweet bell peppers or whole cherry peppers
- 1 medium to large head of cauliflower
- 4 medium carrots
- 4 stalks celery
- 6 cloves garlic
- 2 bay leaves
- 2 sprigs fresh oregano
- 2 tsp (10 g) fennel seeds
- 3 tbsp (45 g) fine sea salt

INSTRUCTIONS

Follow the same technique as for escabeche (p. 90), substituting this chopped vegetable combination instead. You can use either whole cherry peppers or chopped bell peppers. In my experience, pepperoncini (a style of mild to medium heat chili pepper that is usually harvested while green) does not ferment well. Neither their flavor nor texture is particularly great, and its thin skin doesn't offer much flavor or crispness. When you see those iconic neon green-yellow pepperoncinis in jars, they're always quick-pickled.

ESCABECHE

Preparation Time: 15 minutes	Yield: 2 quarts (2 liters)	Fermentation Time: 14–60 days

FERMATRIX SCORE 11

Escabeche has a fascinating history. The word originally comes from the Persian *al-sikbaj*, meaning "vinegar food." After mingling with Spanish cuisine, escabeche eventually became part of Spanish and then Latin American cultures. Today, escabeche is formally known as a fish or meat dish marinated in something sour like vinegar or another acid.

Informally, escabeche is a simpler way to say "pickled vegetables in escabeche style." It's typically found as a condiment at the salsa bar in most Mexican restaurants. Most people look at me quizzically when I mention the word, so I usually call it "taco bar veggies"—people instantly recognize that. However, the style of what you'll find at most taco bars is quick-pickled, meaning they use vinegar rather than fermentation to make their escabeche.

Besides its fantastic flavor, I really like escabeche because it holds up well to a long fermentation. I have had batches actively ferment for over 2 months (even in warm weather!), and there was no degradation in flavor or texture.

INGREDIENTS

- 1/2 lb (250 g) fresh jalapeño or other hot chili peppers
- 1/2 of a medium white or yellow onion
- 4 medium carrots
- 1 medium to large head of cauliflower
- 6 cloves garlic
- 4 sprigs fresh oregano or marjoram
- 3 tbsp (45 g) fine sea salt (to make a 5% brine)

INSTRUCTIONS

1. Wear rubber or latex gloves when handling chilies!
2. Cut away the tops, seeds, and membranes from the chilies. Cut them into 1 inch (2.5 cm) pieces and add them to a half-gallon (2 liter) or larger glass mason jar, crock, or other fermenting vessel.
3. Slice the onions into rings about 1/4 to 1/2 inch (1/2 to 1 cm) thick, then into halves so that they're half-moons. Add to the jar.
4. You don't have to peel the carrots, but scrub off any dirt. Slice the clean carrots diagonally on a bias, about 1/2 inch (1 cm) thick. Add them to the jar.
5. Slice the cauliflower or break it apart with your hands to make 1 inch (2.5 cm) pieces. Add them to the jar.
6. Peel the garlic and gently smash the cloves until they crack, leaving them whole. Add them to the jar.
7. Pluck the oregano leaves from their stems and add them to the jar. Mix the veggies together in the jar.
8. In a pitcher or other container, add salt to 1 quart (1 liter) of filtered water. Stir well to dissolve the salt.
9. Pour the brine into the jar, fully submerging the veggies. Fill the jar until only 1 inch (2.5 cm) of headspace remains at the top.
10. Cover the container with a tea towel or clean dishcloth to keep dust and flies out, then secure the cloth with twist ties or a rubber band. Or if you're using a fermentation airlock, apply it and secure lid.
11. Set your pickle in a cool, dark place. Taste it after 7 days. Let it ferment for up to 60 days! Once you like the taste and texture, move it to the refrigerator, where it will last for several months.

OLIVES

I recently got to pick some fresh olives from a friend's small grove. It's one of the many perks of living in a Mediterranean climate! I believe they were the Mission and maybe Arbequina olive varietals.

Some were green, some were black, and others were somewhere in between. Did you know that the color of an olive has nothing to do with its variety? The color is more indicative of the *ripeness* of an olive when it is picked. Any variety of olive can be picked green (unripe) or if let to ripen, it will manifest its full color (be it purple, brown, or black).

The goal of curing olives is to remove the bitter compounds like oleopurein to make them more edible. There are many ways to do so, including fermentation, water curing, or curing with lye.

I decided to ferment green olives, Sicilian style. It simply entails adding the intact olives (no slitting them first) into a 5% brine and adding the spices and herbs and letting it ferment for 6 months. While it is a much slower process to ferment olives than to chemically remove the bitterness with lye, it is less work up front.

SICILIAN GREEN OLIVES

Preparation Time: 10 minutes	Yield: 2 quarts (2 liters)	Fermentation Time: 6 months

FERMATRIX SCORE 14

INGREDIENTS

- 3 lb (1200 g) green olives, similar size
- 3 tbsp (40 g) fine sea salt (to make a 5% brine)
- 6 cloves garlic
- 1 lemon
- 1 tsp (5 g) dried rosemary
- 1 tsp (5 g) fennel seeds
- 1/2 tsp (3 g) crushed dried red pepper
- 3 sprigs fresh oregano
- 4 dried bay (laurel) leaves
- 4 oz (200 ml) distilled vinegar

INSTRUCTIONS

1. Inspect olives, discarding or composting any olives with holes in them.
2. Dissolve salt in 3 cups (750 ml) water to create a 5% brine.
3. Peel and smash garlic cloves.
4. Peel lemon, ensuring you peel just the yellow part, not the bitter white pith.
5. Add garlic, spices and lemon peels to a half-gallon (2 liter) glass jar.
6. Add olives to jar.
7. Pour vinegar and then brine on top of olives, to 1/2 inch (1 cm) from top of jar.
8. Insert a weight to keep olives from floating.
9. Secure jar with lid or airlock.
10. Ferment 4 to 6 months, until bitter flavor is gone. (You can start tasting them after 4 months).
11. When finished, remove weight and replace airlock with metal lid and ring. Store at room temperature or in the refrigerator. Lasts up to one year.

BEET KVASS: FLIPPING THE SCRIPT

Kvass means "sour" in Slavic languages like Russian. It began as a wild fermented beverage made from stale rye bread, originating in Russia or Ukraine. Then the name spread to encompass other sour beverages in the region, including vegetable tonics.

Beet kvass is a tonic beverage made from infusing beets and other vegetables in a mild brine. The process to make it is essentially the same as it is with other pickled vegetables, with one big exception: the *brine* is the part we consume!

That's not to say you cannot also consume the vegetables, but with kvass, the brine is strained off and drunk. Often, a secondary fermentation is done with kvass (similar to kombucha) to make it a little more palatable. Not that it's unpleasant by itself—it's akin to other slightly salty vegetable juice drinks—but adding effervescence and some sweetness can elevate the beverage and make it more fun.

To make beet kvass, it's important to chop the beets into pieces that are between 1/2 and 1 inch (1.25 to 2.5 cm). If you chop or shred them finer, then you expose a lot more of the natural sugars to the fermenting microbes. The result is usually less predictable and sometimes slimy. That's because with the extra sugar available, yeasts tend to show up at the party. Chopping the beets into 1/2 to 1 inch-sized pieces will encourage the lactic acid bacteria to thrive instead.

Another great thing about beet kvass is that after separating the liquid from the solids, you can reuse the same beets for a "second run" and still get most of the benefits! Simply mix a new brine, leaving about a tablespoon of liquid from the first batch, and repeat the fermentation. It will be slightly less intense in flavor and color than the first run. Once I've made two runs, I typically compost the remaining veggies seeing as at that point, they've given up all they've got, nutrition- and flavor-wise.

BEET KVASS

Preparation Time: 10 minutes	Yield: 1 quart (1 liter)	Fermentation Time: 14 days, plus 3–7 days for secondary fermentation

FERMATRIX SCORE 10

INGREDIENTS

- 1/4 medium cabbage, roughly chopped
- 1/4 white or yellow onion
- 1 inch (2.5 cm) ginger root
- 1 lb (500 g) beet roots, any variety
- 2 1/2 tsp (12 g) fine sea salt (2% brine by weight)
- 2 tbsp (25 ml) pickle brine, sauerkraut brine, or beet kvass
- 2 oz (60 ml) fruit juice, optional

INSTRUCTIONS

1. Roughly chop the cabbage and onion and add to a clean quart-sized (liter-sized) or larger glass jar or other fermentation vessel.
2. Thinly slice or grate the ginger and add to vessel.
3. Remove the beet tops (you can sauté the greens for dinner!), then wash and peel the beets. If you're using organic beets, you can leave the skins on for a more earthy flavor.
4. Chop the beets into 1/2 inch (1 cm) cubes or slices. Add them to the jar. Add them *last* if you're including other ingredients—they'll be the heaviest and will weigh down the lighter veggies.
5. Add the salt to 2 cups (500 ml) of filtered water and stir until the salt dissolves.
6. Add the pickle brine (as a backslop) and then slowly fill the jar with brine.
7. Cover the jar with a tea towel or dishcloth to keep out flies and dust and then secure the cloth with twist ties or a rubber band. If you're using a fermentation airlock device, follow instructions to secure/tighten it.
8. Ferment your kvass in a cool, dark place for 14 days.
9. After 14 days, strain the brine into another container. Now you can do a secondary fermentation if you'd like to add more complex flavors. You can also use the beets for another purpose, like vegetable stock or a second run (see below).

Secondary Fermentation

1. Strain the liquid into a glass bottle with a tight-fitting lid. Swing-top bottles and recycled mineral water bottles with metal caps work well.
2. Add other sweet flavors like fresh fruit juice to balance the salty and sour kvass notes. Use 2 oz (60 ml) fresh juice per quart/liter of kvass.
3. Tighten the cap and ferment at room temperature 1 to 3 days. Burp the bottle daily to ensure that the internal pressure doesn't build up to dangerous levels.
4. Once you like the taste and carbonation levels, transfer the kvass to the refrigerator for storage. Keeps in the refrigerator up to 2 months.

Second Run with Beets

You can reuse the same veggies for a "second run" of kvass. Mix another 2% strength brine (same as above) and pour it over the veggies, then ferment again for the same amount of time or even longer (2 to 3 weeks). It won't be as strong as the first run, but it will still be delicious and rich in probiotics.

NONTRADITIONAL PICKLES

As you've hopefully learned by now, you can ferment practically any vegetable (and other plant parts) and many fruits into pickles. I've fermented things such as garlic flowers, nasturtium pods, green (unripe) tomatoes and green strawberries. Here are a few recipes to inspire you to "think outside the cucumber" and create your own pickles from exotic, nontraditional ingredients.

Nasturtium (*Tropaeolum minus*) is a generous and prolific plant. It flowers multiple times a year and covers the ground well, protecting the soil and its many inhabitants. And every part of the plant is edible! The flowers and leaves are great in salads. It starts to produce its seeds in May in pods of three or four, and those are edible, too. They have a sharp, peppery, mustard-like pungency to them. I've often mashed them to create a wasabi paste substitute, and they can also be pickled. Slightly larger than traditional capers, nasturtium pods offer a locally foraged, seasonal alternative.

Pickling Green Strawberries

Lactic acid fermentation of fruits like strawberries is tricky because of their high sugar content (which tends to ferment into alcohol) and their already high natural acidity (their pH is around 3). That said, you can make a fast fruit chutney of just a few days and achieve lactic acid fermentation. Unripe green strawberries have more starch and less sugar content than their ripe counterparts, and in that state, they can be treated more like cucumbers or other vegetables.

Green strawberries soften during fermentation. Still, they have a lot of crunch—they're like cucumbers with an essence of berries. Fermented green strawberries pair well with a creamy, mild cheese (think Brie or Camembert), in tacos, on a cheese or charcuterie plate, sliced onto a sandwich, atop a green salad, as a cocktail garnish, or simply stirred into some kefir, yogurt, or porridge. Anytime you'd use sweet and sour pickles or even mild pickled peppers, you can use these beauties.

NASTURTIUM POD "CAPERS"

Preparation Time: 5 minutes	Yield:	Fermentation Time: 14 days

FERMATRIX SCORE 8

INGREDIENTS

- 2 cups (250 g) nasturtium seeds
- 2 tsp (10 g) fine sea salt (to make a 4% brine)
- 3 sprigs fresh dill leaves
- 3 cloves garlic, peeled and left whole

INSTRUCTIONS

1. Clean and separate the clusters into individual seeds, removing any plant material like stems and wilted petals. Rinse lightly under cool water.
2. Make a 4% brine by dissolving the sea salt into 1 cup (250 ml) warm water.
3. Add the dill and garlic to a jar, then add the nasturtium seeds.
4. Cover contents with the brine.
5. Cover the jar with a tea towel or dishcloth to keep out flies and dust and then secure the cloth with twist ties or a rubber band. If you're using a fermentation airlock device, follow instructions to secure/tighten it.
6. Ferment at room temperature for up to 2 weeks, then store in the refrigerator for up to 6 months.

PICKLED GREEN STRAWBERRIES

Preparation Time: 15 minutes	Yield: 1 quart (1 liter)	Fermentation Time: 10 days

FERMATRIX SCORE 9

INGREDIENTS

- 2 tsp (10 g) fine sea salt (3% brine)
- 12 to 16 oz (350 to 400 g) unripe green strawberries
- 2 ripe strawberries
- 1 orange, any variety
- 2 bay leaves, fresh or dry
- 2 tbsp (30 ml) pickle brine, sauerkraut brine, kombucha, raw apple cider vinegar, or beet kvass
- 1 tsp (5 g) whole allspice berries
- 1 jalapeño or other chili pepper, optional

INSTRUCTIONS

1. Dissolve salt in 2 cups (500 ml) filtered water to make a 3% strength water brine.
2. Remove the leafy tops from the strawberries and slice them in half lengthwise. You can leave any berries that are smaller than your thumb whole. Rinse the berries well.
3. Zest or peel half of the orange into large strips (use remainder of orange for another purpose). Add the orange peel, bay leaves, allspice, and pickle brine to a quart (liter)-sized mason jar.
4. If you're using a jalapeño, cut off the top. To reduce its heat, remove the seeds and membrane, or leave them in if you want a spicier ferment. Slice the pepper lengthwise into quarters and add it to the jar.
5. Add the strawberries to the jar and insert a weight to keep them submerged in the brine.
6. Slowly pour in the brine, coming up to 1/2 inch (1 cm) below the top of the jar.
7. Close the lid tightly (or use an airlock).
8. If you're not using an airlock vessel, after 2 days, burp the jar to release the internal pressure and observe the fermentation activity. Bubbles will tell you it's happening!
9. Ferment for another 2 to 4 days, burping daily. The strawberries will soften further.
10. Once the strawberries have softened to your liking (this process could take up to 10 days or more), remove the weight and store the berries in the refrigerator.
11. Pickled strawberries will last 1 to 2 months in refrigerator before they start to get mushy.

FIVE WAYS TO USE EXTRA BRINE

As you now know, adding the right amount of salt to water will enable the microbial magic that is fermentation! And a bonus: when you hit the bottom of the jar of your fave ferment, you can do many things with your leftover brine. Whether it's from pickles, sauerkraut, or kimchi, brine is packed with the same probiotics the veggies contain plus lots of salty flavor and the organic acids that developed during fermentation. Culinarily speaking, the brine is a flavor powerhouse! Here are my top suggestions of what to do with leftover brine:

Cook With It

I often save every flavorful liquid I make or find knowing that it can be used in the future. Sauerkraut or pickle brine is a great example of this—both are great for seasoning any soup. Note that bacteria will be destroyed when you cook them at temperatures above about 140°F / 60°C. Still, flavors and organic acids will remain, so there's no need to feel guilty about doing in your probiotics. Just be sure to get them from another source.

Have a Shot

You can drink any leftover brine as a shot. It tends to be salty, so feel free to dilute it 1:1 with filtered water if you're concerned about too much salt.

Mix It Up

Flavorful liquid brine can be mixed with liquor or even beer! A chelada (also known as a michelada) is a refreshing Mexican drink typically made by combining a lighter-style beer such as a lager and some kind of salty/spicy mixer. Depending on the region in Mexico, cheladas are made with lime juice and salt, clamato juice, or tomato juice accompanied by spicy pepper. In short, it's like a Bloody Mary mix (known as a *sangrita*). This brine-infused version has a probiotic spin and the same thirst-quenching effect!

Dress It Up

To add a kick to salad dressings I use brine! Just substitute brine for vinegar 1-to-1 in your dressing recipe.

Use It as Backslop

Save that precious brine for future ferments! It can be used to kickstart new batches. See page 77 for a deeper discussion on backslopping.

PROBIOTIC CHELADA

Preparation Time: 5 minutes	Yield: 1 quart 20 oz. (600 ml)

INGREDIENTS

- 6 oz (150 ml) pickle or kimchi brine
- 1 slice fresh cucumber
- coarse sea salt
- lime wedge
- 12 oz (350 ml) beer (lager or pilsner style)
- ice cubes

INSTRUCTIONS

1. Add ice cubes and brine to two high-ball or pint glasses.
2. Squeeze the lime around the rims of glass, then invert the glass and dip the rims into salt sprinkled onto a plate.
3. Top off the glasses with beer.
4. Add cucumber garnish.

BLACKBERRY SALAD DRESSING

Preparation Time: 5 minutes	Yield: 1/2 cup (250 ml)

INGREDIENTS

- 3 sprigs fresh thyme
- 2 chives
- 1/2 cup (120 g) fresh or frozen blackberries
- 1 oz (30 ml) beet kvass, sauerkraut juice, or pickle brine
- 1/4 cup (60 ml) extra-virgin olive oil or unrefined avocado oil
- 1 tbsp (15 ml) fresh lemon juice
- fine sea salt to taste

INSTRUCTIONS

1. Strip the thyme leaves from their stalks.
2. Mince the chives.
3. Add the blackberries, thyme, chives, and beet kvass or brine to a food processor or blender and blend until smooth.
4. Drizzle in the olive oil slowly, creating an emulsion.
5. Season to taste with lemon juice and salt.
6. Transfer to a jar or bottle.
7. Store in the refrigerator for up to 2 weeks.

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