KOMBUCHA & LACTO-FERMENTATION

how to preserve food without a fridge

what is kombucha: *kombucha is a fermented, slightly alcoholic, lightly effervescent, sweetened black or green tea drink commonly consumed for its supposed health benefits.* [Wikipedia]

what is fermentation: *fermentation is a metabolic process that produces chemical changes in organic substrates through the action of enzymes. in biochemistry, it is narrowly defined as the extraction of energy from carbohydrates in the absence of respiration.* [Wikipedia] *Here it's a process called lacto-fermentation, which is basically just some vegetable or fruit with salt and without air but some specific bacteria.*

gist: *we want to create an environment in which only certain bacteria thrive.*

KOMBUCHA

the gooey pancake thingy is a harmless by-product of the process, the biological description is pellicle, in this context also referred to as symbiotic culture of bacteria and yeast (SCOBY). not strictly required, but makes it look more scary. you need starter liquid. it will lower the pH-value and provide a good amount of starter cells, thus creating a good environment for a specific group of cells

0.
START

put at least 0.1l of starter liquid in a clean vessel.
preferable a 2-3l glass, plastic is also ok, metal is not recommended. cover with a piece of cloth or kitchen paper at all times. it should let air through but nothing else.

- store vessels away from sunlight, in a well-aired place with mostly constant temperature
- the quality of the kombucha heavily depends on the quality of ingredients. try to find the sweat spot for water, tea and secondary ingredients
- if pellicle doesn't swim, don't loose all hope, this is to be expected, especially if you change the environment for F1
- occasionally throw build up of yeast at the bottom away (~ once per month)
- make sure the top of the pellicle is moist, shake the vessel from time to time

1.
TEA & SUGAR

WAIT UNTIL THE TEA REACHES ROOM TEMPERATURE

put *7g of black or green tea* in *1l of boiling water*, let the tea brew for 25'. then add the

70g of white, grained sugar

2.
FIRST FERMENTATION

duration: 7-10 days
depending on: temperature (ideally 25-28°C) and taste (trust your taste-buds! check regularly)

use the rest in F2

keep 0.1l of liquid / 1l new batch

4.
SECOND FERMENTATION

clean the bottle by filling it with boiling water for 15', let the bottle cool down afterwards

tips to maximize carbonation:
- *make sure it's warm enough (20-25°C*
- *leave some head space, but not too much, should be comparable to store-bought beer bottles*
- *add enough tea for the first fermentation*

DO NOT USE SQUARE BOTTLES
VENT EVERY 24h
or be prepared to repaint your kitchen

5.
END
STOPPING FERMENTATION

after ~4d (depending on taste and build up fizz) the kombucha move to fridge or cooler place, this will slow down the process but allow more CO_2 to dissolve into the liquid

3.
SUGAR & FLAVOUR

sugar and / or fruit juice and / or fruit and / or herbs and /or tea and / or spices and / or honey and / or …
experiment!

try 1/2 lemon for 0.5l and 1TS of sugar for a start

TEA FOR F1

black, green, white, lemon verbena are all good choices. some say theanine is required, I say otherwise. if you change the tea, it will take some time for the culture to adapt to the new tea. certain teas are more suited than others, early grey for example is not suited, as the bergamot is slightly anti-bacterial. superb results were had with green jasmine tea.

INGREDIENTS FOR F2

you can try out almost anything, required is only some sugar for the culture.

(all for a 0.5l bottle)

1/2 of a lemon, juiced
  + 1cm cube of ginger
1/4 grapefruit, juiced
  + 1cm ginger, minced
4-6 blueberries, mashed
  [+ 1mL vanilla extract]
1/4 of a lime, juiced
  + 1/4 of a jalapeno
  + 15mL cilantro
1/4 pear, diced
  + 1/2 sprig of rosemary
10mL turmeric root, juiced
  + 1cm cube of ginger
  + 5mL lime juice
  + 5 black peppercorns, halved
15mL carrot, grated
  + 10g beets, grated
  + 1 dash of hot sauce

try out stuff!

WHERE TO GET STARTER?

you can either buy one (search for kombucha starter and SCOBY), ask at your local "natural" pharmacy or similar shops, ask me (Sam) to be put on the list or try with store-brought kombucha. the store-brought one is most likely not active (due to legal issues), it contains mostly dead cells, thus it's hard to say if it contains enough live cells to start the process.

EXPERIMENTS

vary the duration and sugar content if you want a less sour (shorter F1 and / or more sugar) or more sour (longer F2 and / or less sugar), more or less (short duration and / or less sugar) fizzy drink. experiment with different ingredients…
you can expect that certain aspects of the flavour will get stronger. e.g. if you use frozen, and cheap berries it will taste after cheap and frozen berries.

remember: it's alive! can't force a drastic change too quickly.

HEALTH ASPECTS

since you'll be dealing with a life culture, wrong bacteria could grow. don't worry. if you're careful and use a clean environment and tools and follow the instructions it will be fine. kombucha is said to be probiotic, as it contains a lot of living bacteria beneficial to the human gut biome. but don't drink it because of that (as the risks outweigh the benefits).

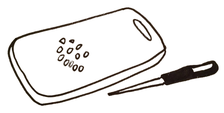
LACTO-FERMENTATION

1.
SELECTING AND CLEANING

just take any vegetable, depending on the texture you get different results. very watery vegetables get very mushy. carrots work very well.

make sure they no longer have any dirt on them. but no hard scrubbing.

2.
PREPARING FERMENT



grate or cut the vegetable or fruit into small enough pieces. garlic can stay in one clove, berries can stay as well in one piece, depending on size (should be around 2cm x 0.2cm x 0.2cm)

3.
PREPARING ENVIRONMENT

prepare something to weigh the ferment down, you can use stones (properly cleaned) or a plastic bag filled with water

clean with fermentation vessel with boiling water, wait 15', and let the vessel cool down again

about the environment

lacto-fermentation is more difficult than kombucha. it requires an environment without air. one way to achieve this is by submerging the ferment. multiple options here: a) use special weights, b) find a flat stone but clean it very thoroughly (heating it up in the oven, and scrubbing like hell), or c) use a plastic bag.

you can also buy a vacuum-machine (e.g. migros sells a cheap hand-vacuum-machine, works wonders).

4.
FILLING VESSEL

1. fill the ferment in the vessel
2. add additional herbs
3. add water until ferment is submerged
4. add 2% of the now measured weight in salt. (here you can experiment heavily, a content of 1-5% is all possible). **make sure to use salt without iodine, as it acts anti-bacterial.**
5. mix
6. add water until ferment is submerged
7. weigh down
8. close vessel

what type of vessel?

again, anti-bacterial material is not recommended; glass is the best, plastic works as well (as long as it's food safe). a vessel with a large mouth, that narrows down towards the top is optimal
it should be able to contain the ferment and have a bit of head space.

if you're using a plastic bag, make sure it is food safe as well

5.
MAGIC

store vessel at room temperature at a place without direct sunlight.

wait for as long as you want, taste regularly. can be from 3 days to weeks or months. at one point all sugar will be consumed and it will stop on its own.

vent every 24h (or if you see gas build up).

6.
STORE

if you think it's ready, place vessel at a cooler place (fridge or cellar) to stop the process.

the ferment can be stored for a long time. but check for mould, and remove it ASAP, but do not throw everything away.

is it mould?

probably not.
if it's white, or has "hair" it probably is.
the best way to deal with mould is not to have it, a clean kitchen, tools, and vessel is very important.
if you're using a plastic bag as weight clean it often and / or replace it regularly.

what to do when I have it?

just remove it, try not to contaminate the whole batch. depending on the contamination you'll have to throw it away. often times it will recover.

what can I use it for?

as an additional ingredient in cooking!
the most well-known ferment is the pickled cucumber.

a garlic-dill ferment and some fish match wonderful, a garlic-chili ferment and a curry, some beet-root with some goat-cheese in a salad, berries added to a müsli, fermented lemons can be used the same way as normal lemons (they just provide an additional kick), do your own kimchi (fermented cabbage and radish), pickle your own cucumbers, …

lacto-fermentation is a gate to a world of new flavours. you can make sauces (e.g. with fermented tomatoes), especially hot-sauces (e.g. with fermented garlic, chili and lemons), or just use it to preserve food.

MORE INFORMATION

- *the noma guide to fermentation*
  by rené redzepi & david zilber
- *the art of fermentation*
  by sandor katz
- */r/kombucha & /r/fermentation*

you'll find a lot on the internet, in the end you'll have to try and see, don't be afraid!

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