**An Exploration of Radish Preservation: Fermentation and Pickling**

Radishes were meant to be preserved. A radish can make it a little over a week in the fridge, but who doesn’t want that deliciousness for a little bit longer. The process of fermentation and pickling was originally set forth just to keep these little morsels around a little longer. Who would have known that these processes would add new complex flavors to the mix and that a fermented or pickled radish could add depth to an already amazing dish?

As you know, fermentation is different than pickling. Today, however, foodies often use those two preservation terms like synonyms but they shouldn’t. It is your opportunity, no your responsibility, to educate the world about these two scientific processes.

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| * **Fermentation** is a metabolic process that converts sugar to acids, gases or alcohol. It occurs in yeast and bacteria, but also in oxygen-starved muscle cells, as in the case of lactic acid fermentation.
* Beer, wine and bread are the earliest products of fermentation. Since Neolithic times, people have been lovin’ the leaven.
* Soy sauce is the world’s oldest condiment (2,500 years old) made from a fermented paste of boiled soybeans, roasted grain, brine, and enzymes.
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| * **Pickling** is the process of preserving or expanding the lifespan of food by either anaerobic fermentation in brine or immersion in vinegar. The resulting food is called a pickle, or to prevent ambiguity, prefaced with the adjective pickled.
* Pickling has occurred since 2500 BC.
* Every year, 5.2 million pounds of cucumber pickles are consumed in America and you eat 9 pounds of them. Say what!
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Check this out: now that you have cultivated those little radishes, you probably want to keep around the fruits of your labor a little longer. Try these two methods and see what happens.

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| Materials and Ingredients Needed |
| Fermentation | Pickling |
| * 1 ½ pounds radishes (no greens) sliced (1/4-1/2” thick)
* 1 quart mason jar washed with hot soapy water
* 1, 4 ounce mason jar washed with hot soapy water
* 2 c treated water
* 1 ½ tablespoons sea salt (without caking agent) or pickling salt
* Chef’s knife
* Cutting board
* Something to boil water
* Soap
 | * ½ pound radishes (no greens) sliced as thinly as possible
* 1 small onion sliced as thinly as possible
* ½ c white vinegar
* ½ white sugar
* 1 ½ teaspoons sea salt
* 1 tablespoon whole peppercorns
* Chef’s knife
* Cutting board
* Bowl
* Plastic wrap
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*Safe food handling techniques must be employed throughout this food preservation exploration. Be sure to tie back hair, remove jewelry, wash hands thoroughly, cover any cuts on hands with a bandage and wear gloves, cough and sneeze away from the food preparation area and clean the heck out of any and all things coming into contact with the radishes and the tools you are using! Oh, and if you are sick… you shouldn’t be in school, but don’t get around the food. Just observe and talk to your teacher so they don’t think you are a slacker.*

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| Directions |
| **Fermentation** | **Pickling** |
| **Cleaning and Slicing**Wash radishes and trim the root ends just before using. With a paring or chef’s knife, slice the radishes. For pickling, also slice the onion into thin wedges and separate the layers of each wedge into pieces.  |
| **Making Brine**Bring 2 cups water and 1 ½ tablespoons sea salt to a boil over high heat. Remove from heat, stir until the salt dissolves and allow to return to room temperature. (Caking agents in salts can inhibit fermentation) | **Making Pickle Marinade**In a bowl, stir together ½ cup white vinegar, ½ cup sugar, and 1½ teaspoons salt until sugar is dissolved.  |
| **Packing** Place all of the radishes for fermentation into the quart mason jar. Pour the brine over the sliced radishes in the mason jar to prepare for fermentation. Leave 1” of headspace (room at the top). Fit the quarter pint jar into the mouth of the quart jar. Pour the remaining brine into the quarter pint jar. Press the quarter pint jar down, until the brine reaches the rim of the quart jar, so that the radishes are completely submerged. | **Packing** For the pickling radishes, pour the marinade over the radishes/onions/peppercorns mix in the bowl. |
| **Fermentation**Let radishes sit on a counter for 5-7 days (in room temperature), until the brine goes slightly cloudy and the radishes taste quite tart. It is a good idea to put a saucer or plate underneath the jar, in case any excess brine bubbles (from carbonation) over and pours over the edge. To prevent contamination from insects, it may be a good idea to cover the jar with a linen towel. | **Pickling**Cover the bowl with the radishes and marinade, using plastic wrap. Place in the refrigerator for at least eight hours or overnight before serving. When opening the container, the radish mixture will have a pungent aroma. |
| **Storage and Use**When they fermented radishes have reached the level of tang you like, remove the quarter pint jar, place a lid on the quart jar and refrigerate.Once fermented, toss them into salads, top cold summer soups with them, savor them plain, use them as veggie crackers, put them on cheese boards or spread them with a little cultured butter. | **Storage and Use**Keep the pickled radishes stored in the refrigerator. Use the pickled radishes within five days. Over time the radish mixture may lose some of its vibrant color, but the flavor will deepen and the radishes will remain crunchy. The color of the pickled mixture may also vary depending on the variety and the age of the radishes.Serve the pickled veggies in place of dill pickles on burgers or brats, on a relish tray or appetizer platter, or as a snack along with crackers and cheese.  |

“God made yeast, as well as dough, and loves fermentation as dearly as he loves vegetation.” –Ralph Waldo Emerson

**Radish Fermentation and Pickling Lab**

**Pre-Lab**

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| **Purpose** |  |
| **Procedure Summary** |  |

**Lab**

**Data/Observations**

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|  | Fermentation Observations | Pickling Observations |
| Day 1 |  |  |
| Day 2 |  |  |
| Day 3 |  |  |
| Day 4 |  |  |
| Day 5 |  |  |
| Day 6 |  |  |
| Day 7 |  |  |

**Post-Lab**

**Questions**

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| 1. What differences in texture were evident upon the conclusion of the preservation lab? |
| 2. What differences in color were evident upon the conclusion of the preservation lab? |
| 3. What changes occurred in the odor of the fermented radish over time? |
| 4. What caused the bubbling of the fermented radish brine? |
| 5. How do the flavors of the fermented and pickled radish compare to a fresh radish? |

**Analysis**

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| 1. Which method of preservation has more health benefits for consumers? Why? |
| 2. Which method of preservation produced a more flavorful radish? Why? |
| 3. What factors in your experiment’s environment could have impacted the length of fermentation? |

**“Gentlemen, it is the microbes who will have the last word.”
-Louis Pasteur**