Vegetable Fermentation Workshop

While other food preservation methods such as canning and drying seeks to eliminate bacteria and other microorganisms lactic fermentation is a mutualistic relationship between humans and bacteria!

Science:
The actual microbial process is complex and involves the conversion of starches and sugars in food into lactic acid through a succession of acid producing anaerobic bacteria. Species of *Caliform* bacteria starts the fermentation and begins to produce lactic acid. As the acidity of the environment increases species of *Leuconostoc* bacteria succeed and continue to produce acids. As the pH continues to drop species of *Lactobacillus* succeed and proliferate. The lactic acid creates an environment so acidic that putrefying bacteria cannot survive. In this way lactic acid works as a natural preservative.

Process:
The key component of lactic fermentation is the creation and maintenance of an anaerobic and acidic environment in which *lactobacillus* can thrive. To ferment food in this fashion a few basic materials are needed:

- **Vegetables** to ferment (**any** can be fermented, but some things may develop a mushy texture)
- **Sea salt** (non iodized) - inhibits many organisms, but is tolerable up to a point by *lactobacilli*.
- A **ceramic crock** pot or **glass container**, and some sort of plate or item to use as **a weight**.

1. Chop vegetables - any way you like - choppers choice!

2. Either: sprinkled with sea salt. **About 1 tablespoon salt per two pounds of cabbage is a good rule of thumb**. The salt draws water out of the vegetables, creating a brine. **Massage the cabbage by hand or mix thoroughly with a wooden spoon to break down the cell wall of the cabbage and draw out water.**

3. Or: create a brine by mixing sea salt and non-chlorinated water. **For brine, mix a ratio of 3 Tablespoons of Salt with 4 cups of water.**

4. The vegetables are then put into a container and pushed down until the **brine completely covers the top of all the vegetables by at least two inches**. The brine creates the anaerobic environment that favors the growth of *lactobacilli*, and serves as a protection against the growth of putrefying microorganisms.

5. Once the crock is filled and the brine is completely covering everything, a **weight should be placed on top to keep everything submerged under the brine.** Without a weight and cover the vegetables may float to the top where exposure to air makes them mold.

6. Leave the crock to ferment! The minimum temperature range for sauerkraut is 50-65 degrees, optimal is 65-90 degrees and maximum is 90-112 degrees. After about three days the ferment will taste acidic, and will increase in acidity overtime. **The longer kraut is left to sit the more time it will have to go through all its microbial transformations and produce the most probiotic kraut.** Vegetables under the brine will remain edible for up to eight months whereas they will begin to get mushy. Cold storage may also help the ferment keep for longer.

Tips For Beginners

- Colder and saltier = slower ferment. Warmer and less salt = faster ferment.
- Check & taste your ferment every day – this way you'll be able to skim off any film that form and get a sense for the fermented flavors you like (the taste changes everyday!)
- If you get a white film, it's OK. Just skim off the film, remove any discolored/darkened vegetables, and wash your weight.
- Avoid fermenting in metal or plastic – these will dissolve/leach into the food.
- Avoid antibacterial soaps. For sterile jars and hands, use vinegar to rinse.
- All the "starter" you need is on the vegetables – you don't need to buy anything special or keep a starter culture alive between ferments.
- Don't Can: Canning diminishes the health benefits and is a lot of work compared to cold storage.

Health and Nutrition

Eating live, fermented foods directly supplies the digestive tract with living cultures that helps build and develop one's cultural ecology. Eating a variety of live fermented foods promotes diversity among microbial cultures in ones body. The main byproduct of lacto-fermentation is lactic acid which promotes the growth of healthy flora throughout the intestine. This flora inhibits the growth of diarrhea related bacteria such as Shigella, Salmonella, and e.coli. Human intestines are lined with a mucosal cell surface which acts as a protection against stomach acids, lactobacillus compete with potential pathogens and protect the mucosal cell surface. They are essentially occupying space that pathogens would be occupying. Eating fermented foods is recommended to prevent a variety of gastrointestinal conditions including diarrhea, constipation, ulcers, and various other digestive disorders.

Fermented foods are also highly nutritious. According to the United Nations Food and Agriculture organization, fermentation improves bioavailability of minerals present in food. As they go through their cycle of succession microbial cultures create B-vitamins including folic acid, niacin, thiamin, and biotin. *Lactobacilli* creates omega 3 fatty acids, essential for cell membrane and immune system function. Lacto-fermentation can remove toxins from food. Examples of this are tropic ferments of cassava or taro, both which are toxic unless fermented. **Ferments must be eaten raw to obtain the full spectrum of nutritional benefits.**

Resources:

- Sandor Ellix Katz's Wild Fermentation (great for beginners) or The Art of Fermentation (a more indepth book) or his website www.wildfermentation.com
- Sally Fallon's book Nourishing Traditions
- For more information on why a oxygen free fermentation is ideal - read this article by Lea Harris http://www.foodrenegade.com/3-biggest-fermenting-mistakes-youre-already-making/
- Sauerkraut Survivor Final Report from the fermentation section of her website http://www.nourishingtreasures.com.
- Sauerkraut troubleshooting from www.picklemetoo.com
- Facebook group: Cultured Club
- Sara Huber: sharedseasonsfarm@gmail.com