Food Technology practical

LAB 4

Pickles

The term pickle is derived from the Dutch (is a West Germanic language) word pekel, meaning **brine**. In most of world countries, the word pickle alone refers to a pickled cucumber except when it is used figuratively, other types of pickles will be described as pickled onion, pickled beets, etc.

Types of Pickles:

1. Gherkin 2. Brined pickles 3. Kosher dill 4. Polish and German 5. Hungarian 6. Romania 7. Lime 8. Cinammon pickles 9. Swedish and Danish.

Brined pickles: are prepared using the traditional process of natural fermentation in a brine which makes them grow Saur. The brine concentration can vary between **20** to more than **40** grams of salt per liter of water, there is no vinegar used in the brine of naturally fermented pickled cucumber.

Fermentation: The fermentation processes is dependent on Lactobacillus bacteria that naturally occur on the skin of growing cucumber. These may be removed during commercial highly harvesting and packing processes.

Nutrition:

1- Contain a moderate amount of vitamin K.
2- Offers 3 kilo calories, most of which come from carbohydrate.
3- High is sodium, one pickled cucumber contain 350-500mg.

4- Ability to act as vegetables with a high probiotic content. such as L. plantarum and L. brevis.

Isolation of Lactobacillus after fermentation:

Cucumber

↓

Washing

↓

Cutting

↓

Brine solution
(5 gm NaCl+1/4 Liter D.W)

↓

Incubator 37C° for 3 days
(fermentation)

↓

(Isolation)
1% of fermented cucumber

↓

MRS broth
(Man-Rogosa-Sharpe)

↓

Incubated (an aerobic condition)
37C° for 48 hr.

↓

Serial dilution

0.1 ml on MRS agar
Incubated (an aerobic condition)
37C° for 48 hr.

Diagnosis in Microscope: smear slide pick up colony staining examined under microscope.

Sauerkraut:

German pronunciation, is finally cut **cabbage** that has been fermented by various **Lactic acid bacteria**., it has a long shelf -life and a distinctive sour flavor, both of which result from the lactic acid that forms when the bacteria ferment the sugars in the cabbage.

Note: The word "kraut" derived from this food, is a derogatory term for the German people., during World war I due to concern the American public would reject a product with a German name, American sauerkraut makers relabeled their product as Liberty cabbage' for the duration of the war.

Cabbage fermentation: Sauerkraut is made by a process of pickling called **Lactic acid fermentation**. That is analogous to how traditional (not-heat treated) pickled cucumbers are made, the cabbage is finely shredded, Layered with salt, and left to ferment. Fully cured sauerkraut Keeps for several months in an airtight container stored at 15c° or below.

Neither refrigeration nor pasteurization is required although these treatments prolong storage life.

The Microorganisms that can be found in sauerkraut:
after fermentation

1. **Lactobacilli** is introduced naturally, as these air-borne. bacteria culture on raw cabbage leaves where they grow.
2. **Yeasts** also are present, and may yield soft sauerkraut of poor flavor when the fermentation temperature is too high.
3. **First phase of Fermentation (naturally):** anaerobic bacteria such as **Enterobacter** lead to fermentation, and begin produced an acidic environment that flavors later bacteria.
4. **Second phase:** starts as the acid levels become too high for many bacteria, and **Leuconostoc mesenteroides** and other **Leuconostoc spp.** take **dominance**.
5. **Third phase:** various Lactobacillus species, including L. brevi and L. plantarum, ferment any remaining sugars, further lowering the pH.
   [These 3 phases in Fermentation process, collectively sometimes referred to as **population dynamics].**
   Note: Properly cured sauerkraut is sufficiently acidic to Prevent a favorable environment for the growth of **Clostridium botulinum**, the toxins of which cause botulism.
6. The genomic study found an unexpectedly large diversity of Lactic acid bacterice in sauerkraut, Weissella was found to be a major organism in the initial, hetero fermentative stage, up to day 7. It was also found Pediococcus pentosaceus had smaller population numbers in first 14 days.

The benefits:

1. Source of wit. B, C, and k.
2. High in calcium and magnesium.
3. Very good soure of dietary fiber, iron, copper.
4. Supply of probiotics improve digestion and promote the growth of healthy bowel flora, protecting against many disease.
5. Is a time honored folk remedy for canker sores.
6. Inhibit the growth of cancer cells because it has key **detoxifying enzymes** of and was its Chemo preventive activity
7. Is high in the **lutein** and **Zeaxathin** (antioxidant) both associated with preserving **ocular health**.

Fermentation and Isolation: as the same as in Pickles.