



Hidden gems of fermentation: Beet kvass and Mesu pickle

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Abstract

Fermented foods have long been valued for their multi-beneficial properties like improving gut health, probiotic supplier and food preservation opportunities. This paper focuses on two unique but traditional fermented food products – Beet kvass and Mesu Pickle. Beet kvass, a beverage made from fermented beetroot, rich in bioactive components that may support in immunity and digestion. On the other hand, Mesu pickle, a fermented bamboo shoot product commonly prepared in certain regions, is known for its uniqueness and probiotic potential. These foods can be categorized as functional foods due to their potential health benefits beyond basic nutrition. The study highlights the nutritional composition, fermentation process, potential towards human health benefits of these foods. Studying such traditional foods helps us understand the importance of fermentation and encourages the locally available ingredients in a healthy diet. Such traditional fermentation practices can contribute to the sustainable diets and promote inclusion of culturally significant foods in modern nutrition.

Keywords: Fermented; Bioactive; Probiotic; Immunity; Functional-food

1. Introduction

Throughout the world, there are many different types of fermented foods, in which a range of different metabolized by a variety of microorganisms to yield products with unique and appealing characteristics. Fermentation is a traditional process through which microorganisms like yeast and bacteria convert carbohydrate into alcohol and acids. Fermentation enables the preservation of perishable foods and has been used for centuries means fermentation increases the shelf life of those foods which undergo rapid deterioration [1].

2. Introducing Beet kvass and Mesu pickle

Beet kvass is a fermented drink made by culturing beets in salt brine. It has a similar taste like beet juice. To make Beet kvass, there is only need of handful of ingredients like beets, salt and optional flavorings like lemon, spices [2].

The word Mesu derived from Limbu dialect. In Limbu dialect ‘me’ stands for young bamboo and ‘su’ stands for sour. Mesu pickle is a traditional fermented bamboo shoot product with sour acidic taste eaten as pickle. The tender bamboo shoots along with different spices are stored in jar for further fermentation process. Mesu pickle is popularly used in the Northeast parts of India [3].

Beet kvass and Mesu pickle are two examples of naturally fermented foods that come from different cultural backgrounds. Both of these foods are produced through natural fermentation by lactic acid bacteria, which enhance their safety and nutritional value.

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3. Origin of Beet kvass and Mesu Pickle

The concept of kvass came from Russia. Beet kvass is specifically invented in Ukraine [4]. The uses of mesu (bamboo shoots) are popular in Darjeeling and Sikkim regions of India [3].

4. Different fermentation processes:

Fermentation process can be of different types like aerobic, solid state, submerged fermentation.

Aerobic fermentation occurs in the presence of oxygen while Anaerobic fermentation occurs in the absence of oxygen. Aerobic fermentation is of two types like solid state and submerged fermentation. Solid state fermentation done on solid material with no use of water while in Submerged fermentation occurs in a medium, where water is used as a medium.

There are also different terms like Homofermentative and heterofermentative fermentation. In Heterofermentative process, there is production of different types of products. For example, fermentation of any food by yeast produces different products like carbon-di-oxide and ethanol. Some specialized strains can be modified for the production of lactic acid also. In the Homofermentative process, there is production of only a single type of product. In any fermentation initiated by bacteria produces generally lactic acid.

In Alcoholic fermentation sugars are converted into ethanol and carbon dioxide by yeast. whereas in Acetic acid fermentation, glucose is firstly converted to ethanol and ethanol is converted to acetic acid [5].

4.1. Some fermented products from each food groups

Table 1 Fermented products from cereals

Sake	Alcoholic drink from rice
Handia	Popular rice beer
Tape	Fermented cassava
Brem	Fermented solid snack or liquid drink
Dosa	Crepe from fermented rice and black gram dal.

Table 2 Fermented products from pulses

Miso	Fermented soyabean paste
Natto	Fermented beans
Tempeh	Fermented soyabean cake
Doenjang	Fermented soyabean paste
Soya sauce	Fermented soyabean sauce

Table 3 Fermented products from vegetables and fruits

Sauerkraut	Fermented cabbage
Kanji	Fermented drink from carrots
Sinki	Dried fermented radish
Gundruk	Dried fermented green leafy vegetables
Perry	Fermented drink from pears
Boukha	Fermented beverage from figs

Table 4 Other important fermented products from different food groups

Mead	fermented beverage from honey and water
Kombucha	Fermented tea
Kefir	Fermented milk drink
Chhurpi	Fermented cheese

5. Microorganisms used in fermentation

Different microorganisms- bacteria, yeast and molds are used in the fermentation process. Bacteria like *Lactobacillus delbrueckii*, *Streptococcus thermophilus* used in the yoghurt production [6]. Molds like *Aspergillus* used in soya sauce production [7]. Yeasts like *Saccharomyces cerevisiae* used in the production of wine and beer.

5.1. Principle of fermentation process

In fermentation process, carbohydrates convert to alcohol and acids. In fermentation acids like lactic acid is produced. This acid reduces the pH of food, making the food more acidic [1]. Some gases are also produced in the fermentation process. These gases make the food texture soft, which is a very common characteristic in any fermented foods.

5.2. Fermentation process in Beet kvass and Mesu pickle

Beet kvass is fermented by Lactic acid bacteria, specifically the strains of microorganisms like *Lactobacillus casei* and *Leuconostoc mesenteroides* [8]. Mesu pickle is basically prepared from bamboo shoots. The fermentation process of Mesu initiated by *Lactobacillus*, *Candida*, *Saccharomyces cerevisiae* are used. Other microorganisms like *Enterococcus faecium*, *Lactobacillus plantarum* are also used [9].

5.3. Health benefits related to Beet kvass and Mesu pickle

The probiotics produced in fermentation in Beet Kvass can help to restore the balance of friendly bacteria in gut and helps in establishing gastrointestinal health. Due to high probiotic content, Beet kvass gives the immune system a boost. Beet kvass is rich in different micronutrients like iron, ascorbic acid, Zinc. All of these minerals have several benefits. Like iron prevents several forms of anemia like macrocytic anemia, microcytic anemia, Hypochromic anemia etc. Ascorbic acid reduces scurvy, Zinc reduces the incidence of acrodermatitis enteropathica. Beet kvass is a rich source of Betalains [10]. It is a component of food that acts as a preventive drug. This component helps liver to break and eliminate harmful chemicals and toxins. Fermented foods like Beet kvass have been associated with a lower risk of heart disease.

The bamboo shoots are rich in fiber thus help to reduce serum cholesterol. Bamboo shoots can increase the production of white blood cells [11]. This bamboo shoot component can lower the low-density lipoprotein. Bamboo shoots are rich in phytosterols. Bamboo shoots are a prominent source of edible fiber (6 to 8 gm in 100 gm of fresh weight) [12].

5.4. Several bioactive components in beet and bamboo shoots:

There are several variations in beet like table beet, sugar beet, fodder beet etc. There are several types of bioactive compounds like Apigenin, Kaempferol, caffeic acid, Chlorogenic acid, p-coumaric acid [13].

There are several phenolic compounds like ferulic acid, caffeic acid, syringic acid, chlorogenic acid. There are several sterols like ergosterol, campesterol are also found in the bamboo shoots [14].

Table 5 Several bioactive components in Beet kvass and Mesu pickle

Apigenin	Neuroprotective properties
p-Coumaric acid	Protection against Alzheimer's
Ferulic acid	Reduces Reactive oxygen species
Campesterol	Lowering LDL level.
Chlorogenic acid	Cardio protective properties
Syringic acid	Reducing blood glucose level

6. Conclusion

Beet kvass and Mesu pickle are good examples of traditional fermented foods that are both healthy and useful. Beet kvass helps improve digestion and gives important nutrients, while mesu pickle adds taste and also supports gut health because of beneficial bacteria. These foods show that old preservation methods are not only simple but also increase nutritional value and shelf life. Including such fermented foods in our daily diet can help maintain better health in a natural way.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest.

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