

# Health-promoting microbes in traditional Vietnamese fermented foods: A review

Nguyen La Anh\*

Food Industries Research Institute, 301 Nguyen Trai Rd, Thanhxuan Distr., Hanoi 100000, Viet Nam

Received 24 March 2015; received in revised form 14 August 2015; accepted 20 August 2015

## Abstract

Vietnam has a long history of numerous traditional fermented products that contain a range of microorganisms with favorable technological, preservative, and organoleptic properties for food processing as well as other functional properties. This review emphasizes the most common traditional Vietnamese fermented foods and their beneficial indigenous bacteria having health-promoting effects.

© 2015 Beijing Academy of Food Sciences. Production and hosting by Elsevier B.V. All rights reserved.

**Keywords:** Traditional fermented foods; Lactic acid bacteria (LAB); Microflora; Probiotic; Health effect

## 1. Introduction

Non-dairy fermented foods are popular in Asia; among these, nutritional and physiological properties of Korean *kimchi* are the most well characterized [1,2]. Other fermented foods in Asia have been reviewed in terms of their processing technology and the role of lactic acid bacteria (LAB) in the organoleptic, preservative, and nutritive properties of these foods [3]. However, data on Vietnamese traditional fermented foods are limited. Vietnam, located in Southeast Asia, is a tropical and highly populated country with a long history of numerous traditional fermented products. Unlike western countries, where commercially fermented foods are produced on a large scale using industrially produced starter cultures, in Vietnam, these foods are produced largely in the household or on small scale using methods that are passed down from one generation to another. Most traditional Vietnamese fermented products are artisanal and are closely related to the local natural microbiota, which makes them a pertinent source of beneficial indigenous microorganisms.

Studies on Vietnamese traditional fermented foods have mainly focused on their microbial biodiversity and technological and organoleptic properties such as lactic acid production, flavor development, and food preservation. Several recent studies have been performed on health benefits of microbes isolated from fermented foods; however, the available data are still sparse. This review summarizes data on traditional Vietnamese fermented foods to provide a detailed overview of their functional properties.

## 2. Discussion

### 2.1. Vietnamese traditional fermented foods

A list of the most popular Vietnamese fermented foods is given in Table 1. With respect to fermentation, traditional Vietnamese fermented foods are categorized into two groups: (i) food requiring short-term fermentation and (ii) food requiring long-term fermentation. Foods produced by short-term fermentation usually have a sour taste, are used for direct consumption or stored at 4–8 °C, and have a short shelf life. Foods produced by long-term fermentation have high salt (sodium chloride) content to prevent pathogenic contamination. Similar to other Asian cuisines, raw materials used for preparing traditional Vietnamese fermented foods are usually non-dairy based

\* Corresponding author at: Food Industries Research Institute, 301 Nguyen Trai Rd, Thanhxuan Distr., Hanoi 100000, Viet Nam. Tel.: +84 438583450; fax: +84 438584554.

E-mail address: [anhnl@firi.vn](mailto:anhnl@firi.vn)

Peer review under responsibility of Beijing Academy of Food Sciences.

Table 1  
Representative traditional fermented foods in Vietnam.

Product name	Product	Ingredients	Origin	Microbial flora	Reference
Short-term fermentation					
<i>Nem chua</i> Sausage	Appetizer	Raw pork lean, rind, powder roasted rice, spices, salt	Countrywide	<i>Lactobacillus plantarum</i> <i>Pediococcus pentosaceus</i> <i>Lb. brevis</i> <i>Lb. farciminis</i> <i>Lb. brevis</i> <i>Lactococcus garvieae</i>	[4–11]
<i>Thit lon chua</i> Sour fermented pork	Appetizer	Pork, powder roasted rice and spices	North	<i>Lactic acid bacteria</i>	[12]
<i>Com me</i> Sour rice fermented paste	Seasoning, acidifying additive	Cooked rice	Countrywide	<i>Lb. plantarum</i> <i>Lb. paracasei</i> <i>Lb. casei</i> <i>Lb. acidophilus</i>	[13]
<i>Dua chua</i> ( <i>Dua-muoi</i> ) Fermented fruit or vegetable	Appetizer	Fruit or vegetable derived, salt	Countrywide	<i>Lb. fermentum</i> <i>Lb. pentosus</i> <i>Lb. plantarum</i> <i>P. pentosaceus</i> <i>Lb. brevis</i> <i>Lb. gaserri</i>	[16–19]
Long-term fermentation					
<i>Mam chua</i> Sour fermented fish paste	Dipping sauce	Fresh or sea water fish, herbs, alcohol, salt, sugar	South	<i>Lactobacillus</i> sp. <i>Bacillus</i> sp. <i>P. acidilactici</i> <i>Lb. farciminis</i> <i>Staphylococcus hominis</i>	[22–24]
<i>Tom chua</i> Sour fermented shrimp	Appetizer	Fresh or brackish water shrimp	Centersouth and South	Halophilic <i>Lactobacillus</i> sp. <i>Lb. plantarum</i>	[25]
<i>Nuoc mam</i> Fish sauce	Seasoning Dipping sauce	Sea water fish, salt	Countrywide	Halophilic <i>Lb. plantarum</i> <i>B. subtilis</i>	[28]
<i>Tuong</i> Soybean sauce paste	Seasoning Dipping sauce	Soybean, cooked sticky rice, salt	North and Central	<i>B. subtilis</i> <i>Bacillus</i> sp. <i>Enterobacter mori</i>	[29–31]

and inexpensive and contain various vegetables (*e.g.*, eggplant, radish, cabbage, bamboo shoot, bean sprout, leek, onion, and cucumber), fruits (*e.g.*, edible fiber of jackfruit, fig, and young mango), rice, fish, shrimp, and meat. Herbs and spices such as garlic, black or red pepper, green onion, and ginger, are often used as minor ingredients. Fermentation temperature largely depends on natural environment. It may also be controlled by leaving the food in the sun or in the shadow depending on the traditional procedure. LAB strains play an important role in the fermentation of many foods. Vietnam is a long-shaped country with different soil and climate conditions depending on the latitude. Therefore, traditional fermented foods may feature local produce or may be common throughout the country, with only slight modifications. These products are often consumed daily as appetizers or side dishes.

### 2.1.1. *Nem chua*

*Nem chua* is a fermented sausage product that is relatively well studied [4–6]. Preparation of *Nem chua* is common in different parts of the country (Fig. 1). The main ingredients of *Nem chua* include finely ground pork lean (95% protein), boiled and

sliced pork rind (5% protein), powdered and roasted rice, salt (approximately 2%, *w/w*), and spices (pepper and garlic). *Nem chua* is prepared as follows: the ingredients are mixed according to the recipe and the mixture is then shaped into small cubes or cylinders, covered with some herbs such as pieces of guava or Ming aralias leaves and pieces of garlic or chilies (depending on local areas), wrapped in banana leaves by folding the two ends of the rolls tightly, and covered with a larger piece of banana leaf. This careful wrapping prevents air penetration into the mixture, thus creating a relatively anaerobic environment that favors the growth of LAB and makes the product sour and ripened after 1–2 days depending on the ambient temperature (20–37 °C). Powdered and roasted rice used in the traditional method used of preparing *Nem chua* acts as a carbohydrate source for the growth of indigenous LAB and contributes to the sour taste. Manufacturers sometimes use a piece of fermented *Nem chua* of a previous batch as a starter culture for producing a new batch.

The cell density of LAB is  $(9 \pm 1.3)$  (lg (CFU/g)) by the end of fermentation, which is quite high and lowers the pH of the final product to 4.64–4.77, which was required to keep the product at the acceptable microbiological safety [5].

Download English Version:

<https://daneshyari.com/en/article/2686647>

Download Persian Version:

<https://daneshyari.com/article/2686647>

[Daneshyari.com](https://daneshyari.com)