

Frequently Asked Questions:

1. What are traditional fermented foods?

Ans: Traditional fermented foods are popularly consumed and form an integral part of our diet since early history. It can be prepared in the household or in cottage industry using relatively simple techniques and equipments. Fermentation is one of the oldest and most economical methods of producing and preserving food. In addition, fermentation provides a natural way to reduce the volume of the material to be transported, to destroy undesirable components, to enhance the nutritive value and appearance of the food, to reduce the energy required for cooking and to make a safer product.

2. Write about brief history of the traditional fermented foods?

Ans: Since the dawn of civilization, methods for the fermentation of milks, meats, vegetables and cereals have been described. The earliest records appear in the Fertile Crescent (Middle East) and date back to 6000 BC. Of course, the preparation of these fermented foods and beverages was in an artisan way and without any knowledge of the role of the microorganisms involved. However, by the middle of the nineteenth century, two events changed the way in which food fermentations were performed and the understanding of the process. Firstly, the industrial revolution resulted in the concentration of large masses of populations in towns and cities. As a consequence, food had to be made in large quantities, requiring the industrialisation of the manufacturing process. In the second place, the blossoming of Microbiology as a science in the 1850s formed the biological basis of fermentation, and the process was understood for the first time. Ever since, the technologies for the industrial production of fermented products from milk, meat, fruits, vegetables and cereals are well developed and scientific work is actively carried out all over the world. India is traditionally rich in fermented foods. In the Indian sub-continent, fermented food using local food crops and other biological resources are very common. But the nature of the products and base material varies from region to region. Fermented foods such as idli and dahi were described as early as 700 BC. At present, there are hundreds of fermented foods with different base materials and preparation methodology.

3. Briefly write an account on Idli – a traditional fermented food.

Ans: A fermented, thick suspension made of a blend of rice (*Oryza sativum*) and dehulled black gram (*Phaseolus mungo*) is used in several traditional foods in Southeast Asian countries. Among them, idli and dosa are very popular in India and Sri Lanka. Traditionally, for idli preparation the rice and black gram are soaked separately. After draining the water, rice and black gram are grinded independently, with occasional

addition of water during the process. The rice is coarsely ground and the black gram is finely ground. Then the rice and the black gram batters are mixed together (2:1 ratio) with addition of a little salt and allowing to ferment overnight at room temperature (about 30 °C). Finally, the fermented batter is placed in special idli pans and steamed for 5–8 min.

4. Mention the important microbes responsible for the fermentation of Idli.

The lactic acid bacteria *Leuconostoc mesenteroides*, *Streptococcus faecalis*, *Lactobacillus delbrueckii*, *Lactobacillus fermenti*, *Lactobacillus lactis* and *Pediococcus cerevisiae* have been found to be responsible for the fermentation process, although *L. mesenteroides* and *S. faecalis* are considered to be the microorganism essential for leavening of the batter and for acid production in idli. The yeasts *Geotrichum candidum*, *Torulopsis holmii*, *Torulopsis candida* and *Trichosporon pullulans* have also been identified in idli fermentation. Fermentation of idli batter appears to have a significant effect on the increase of all essential amino acids and in the reduction of antinutrients (such as phytic acid), enzyme inhibitors and flatulose sugars.

5. Write a short note on Dokla – a traditional fermented food.

Ans: Dhokla is also similar to idli except that Bengal gram dhal is used instead of black gram dhal in its preparation. A mixture of rice and chickpea flour is also used as the substrate for the fermentation. As in idli preparation, the fermented batter is poured into a greased pie tin and steamed in an open steamer. As in other indigenous fermented foods, a significant improvement in the biological value and net protein utilisation of dhokla due to fermentation has been reported.

6. How to prepare fermented rice or Pazhaiya soru?

Ans: Fermented rice or Pazhaiya soru is prepared by adding water to cooked rice and by incubating the mixture overnight, and finally adding buttermilk and salt and directly consumed. It is an early morning diet for farmers prior to going to the field. Predominant microbiota isolated from these foods include: *Lactobacillus fermentum*, *L. plantarum*, *Enterococcus faecalis*, *Pediococcus acidilactici*, *P. cerevisiae*, *L. mesenteroides*.

7. Write a short note on Gundruk – a traditional fermented food?

Ans: *Gundruk* is a fermented vegetable product indigenous to the *Nepali* people of the Himalayan region. It is commonly prepared during winter i.e, October to December, when perishable leafy vegetables are plenty. These vegetables are mainly leaves of mustard (*Brassicca juncea*), *rayo-sag* (*Brassicca rapa*), cauliflowers (*Brassicca oleracea*),

radish (*Raphanus sativus*) and some other locally grown vegetables. The microorganism predominantly occurring in *gundruk* have been identified as *Lactobacillus brevis*, *L. plantarum*, *L. paracasei*, *Pediococcus pentosaceus*, *P. acidilactici* and *Leuconostoc fallax*.

For its fermentation, fresh leaves of the selected vegetables are first wilted and shredded using a sickle or knife. These are then crushed mildly and pressed into an earthen pot. The container is then made air tight and left to ferment naturally at room temperature for about 7 to 10 days. After the incubation period the leaves takes a mild acidic taste which indicates the completion of fermentation. The *gundruk* is then removed and sun dried for 3 to 4 days, which helps in storage. *Gundruk* is sold in all the local markets of Darjeeling hills and Sikkim by the *Nepali* women. It is eaten as a soup or pickle. The soup which is prepared after mixing *gundruk* with certain ingredients serves as a good appetizer.

8. Write a short note on fermented bamboo shoot – a traditional fermented food?

Ans: This is another fermented product which is extensively used in the states of North-East India and bears resemblance to *jiang-sun* and *kardi* in Orissa, India. It is mainly used as a taste enhancer and flavour provider. Many varieties of bamboo are used separately by the different tribes using their own traditional techniques.

Soibum/ Soidon are fermented bamboo shoot products and are indigenous foods of the state of Manipur. They are consumed as an indispensable part of the *Manipuri* diet and are familiar with the social customs of the people. *Soibum* is produced exclusively from succulent bamboo shoots. The organisms found to be associated with the fermentation of *soibum* have been identified as *Lactobacillus plantarum*, *L. brevis*, *L. coryniformis*, *L. delbrueckii*, , *L. lactis*, *Leuconostoc fallax*, *L. mesentroides*, *Enterococcus durans*, *Streptococcus lactis*, *Bacillus subtilis*, *B. licheniformis*, *B. coagulans*, and the yeasts.

9. What are fermented beans?

Ans: Fermented foods made from legumes constitute an important part of the human diet in many developing countries, including India. Fermented soybean products have been reported to be used extensively in almost all the states of North-East India.

Kinema is a soybean based fermented food. The soybean (*Glycine max*) is locally known as *bhatmas* and the varieties used are “yellow cultivar” and “dark brown cultivar”. It is produced individually or on household level and sold in the local markets. It is extensively prepared by the *Nepalis* belonging to the *Limboo* and *Rai* castes of Sikkim.

Hawaijar Produced in the state of Manipur, *Hawaijar* is a sticky fermented soybean product.

Aakhone/ Bekang / Peruyyan: These are all fermented soybean products and known by different names among different tribes. They are prepared from soybean (*Glycine max* (L.) Merrill). Lactic acid bacteria, *Bacillus subtilis* and other *Bacillus* species have been found in these samples.

10. Write an account on Khalpi – a traditional fermented food??

Ans: *Khalpi* is a cucumber product of the state of Sikkim and Darjeeling hills. It is generally prepared for home consumption by the *Nepali* Brahmins belonging to the *Bahun* and *Chettri* castes. Microbes associated with its fermentation have been identified as *Lactobacillus plantarum*, *L. brevis* and *Lecunostoc fallax*. For preparation of *khalpi*, mature and ripened cucumbers are cut into definite sizes and sundried for 2 days. They are then put into bamboo vessels called *dhungroo* and sealed. Fermentation is allowed to take place for 4 to 7 days at room temperature. The product can be stored for about a week in an air tight container. It is taken as a pickle after mixing with mustard oil, chillies and salt.

11. Explain what are milk based fermented foods?

Ans: Milk and milk-based products are consumed most popularly due to their nutritive value. Most of the foods in this category are prepared by simply adding lactic acid bacteria to milk of either cow, buffalo or yak and allowed to ferment. One such fermented food is dahi, its description is found in texts as old as 700 BC. Dahi or curd is most popular and commonly used traditional Indian fermented product. Dahi differs from yogurt in its use of mixed starters of mesophilic lactococci. A principal flavour-inducing metabolite is diacetyl, which is appreciated more by people of South Asian origin compared to the acetaldehyde flavour in yogurt.

12. Mention important milk based fermented foods?

Ans : The important milk based fermented foods are Kadi, Churpa/Churpi, Nudu and Shyow. In Himachal Pradesh, traditional milk based products are prepared from the milk of several species of indigenous cattle, buffalo, sheep, goats, and churu (hybrid of cow and yak). Kadi is prepared by simmering a mixture of chaa/buttermilk, besan/gramflour and spices. Buttermilk is boiled, then water is discarded and solids are dried hard which later used to prepare soups called churpa or churpe. Nudu is a ceremonial food prepared by cooking wheat flour in milk with small amount of salt and is eaten with ghee.

Shyow is a thick gel curd like product, prepared from yak milk. Mohi is buttermilk, prepared by churning dahi. It is consumed as a refreshing beverage. Somar is a soft paste, strong flavoured with bitter taste and is consumed as soup along with cooked rice or finger-millet by the Sherpas of Sikkim. Philu is a typical indigenous cream-like milk product obtained from cow milk or yak milk and is mostly eaten as a cooked paste delicacy with boiled rice by the Sikkimese..

13. Give an account of the meat based fermented foods?

Ans: In India, people of the North-eastern region ferment meat of yak, goat, pig, fish and crab for preservation for longer period. Kargyong is an ethnic sausage-like fermented product prepared from yak, beef and pork.

Fermented fish products are important dietary components in the protein deficient South-East Asia. Preservation of fish by salt is an age-old technology. Hentak is a ball-like paste prepared by fermentation of a mixture of sun-dried fish (*Esomus dandricus*) powder and petioles of aroid plants (*Alocasia macrorrhiza*) in Manipur. Tungtap is a fermented fish paste, commonly consumed by the Khasias tribes of Meghalaya in the North-eastern state of India. Dry fish (*Danio* spp.) is mixed with salt, kept in an earthen pot and fermented for 4–7 days. It is consumed as pickle.

14. List out important microbes isolated from meat based fermented foods?

Ans: *Lactobacillus lactis* subsp. *cremoris*, *Lactococcus plantarum*, *E. faecium*, *Lactobacillus fructosus*, *L. amylophilus* and *L. corneiformis* subsp. *torquens* are predominant LAB species reported in fermented meat based products.

15. What are the health benefits of traditional fermented foods?

Ans : Indian fermented foods are consumed by the local population not just as a diet but as traditional medicine too. Many of the foods were observed to have beneficial effect during ailment by the local people and they are used as a special diet or medicine for ages. Fermented food idli is easily digested and often used as food for infant and invalids. It is a prescribed diet in the hospitals for patients undergoing treatment. Koozhu is included in the daily diet of rural and agricultural workers and is claimed to be a nourishing health food. There is an increase in thiamine, riboflavin and niacin contents during its fermentation. Koozhu is given to children at weaning age. Fermented milk dahi can be used to cure intestinal disease such as diarrhea.

Certain fermented vegetable products (gundruk, sinki, Kanjika and Iromba) are said to be good appetizers, and the ethnic people use these foods for remedies from indigestion. Bhutia women use gundruk soup and give it to breast-feeding mothers to

improve milk efficiency. It is considered as a tonic for old age people. Fermented radish root pieces are called sinki. It is very effective in curing diarrhea and stomach pain, and is consumed mostly during lean period. Iromba is prepared from tree bean (*Perkia roxburgii*) and is considered an appetizer. Fermented rai helps in curing stomach pain and gas trouble, and significantly improves digestion. Kanjika or kanji is a lactic fermented rice product. It has been prescribed for a number of chronic diseases by Indian ayurvedic practitioners. Carrot Kanji is considered to have high nutritional value and cooling and soothing properties. Beetroot kanji is considered to have potential to prevent infection and malignant disease. Most of the health benefit claims for these traditional fermented foods based on traditional belief, hence there is a scope to conduct scientific survey and experiment-based research to prove these claims