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Value of Starch in Indian Traditional Food System

Shyamalima Gogoi

Abstract

In India, food habit is profoundly influenced by traditions, cultural choices, and religions. For years traditional Indian foods have been prepared, and preparation varies across the country. The wisdom about processing of food, its preservation techniques, and their therapeutic effects has been established for many generations. Starch is the most commonly consumed type of carbohydrate which is found deposited in many crops, such as wheat, corn, rice, and potato, and it serves as the most important source of energy for humans. Starch is classified as complex carbohydrates, and traditionally, complex carbohydrates have been viewed as healthier options. India harbors many plants, out of which traditional starchy tubers and roots which have the potential to be used as sources of flours and starch are also recognized as functional foods because of the presence of functional components such as body-healing chemicals, antioxidants, dietary fibers, and probiotics.

Keywords: traditional, therapeutic effects, antioxidants, probiotics

1. Introduction

1.1 Starch overview

Starch is the major source of carbohydrate and energy reserve in plants, which accumulates in granules and in stems, tubers, corn, seeds, and roots [1]. Starch-bearing cereal rice, corn, wheat, and maize are the main sources of dietary energy for the world's population. Plants constitute as the most useful raw material for starch production, and apart from cereals, tubers (such as potatoes) and roots (manioc or cassava) have also high content of starch. It has a wide use and application in food industry as a thickener, gelling agent, a stabilizer for making snacks, meat products, fruit juices, etc. [2]. It is the most common carbohydrate in human diets and represents one of the main sources of energy to sustain life [3].

1.2 Constituents of starch

Starch is a degradable, natural, renewable polymer of higher plants, which is white, tasteless, and odorless when grinded into powder that is insoluble in cold water or alcohol. Amylopectin and amylose are the two main constituents of starch which are high molecular weight polymers of linear chains of glucose units linked by α -1,4 glycosidic bonds and are highly branched at the α -1,6 positions by small glucose chains [4]. Amylose is generally linear, while amylopectin is highly branched with dense structure containing hundreds to thousands of glucose residues.

2. Traditional food

India is well known for its vast knowledge on traditional practices, and they are used by various ethnic groups since prehistoric times. In India people mostly depend upon the agricultural resources and starch being the most abundantly available agricultural product. The Indian indigenous food or traditional food is localized, mainly confined to various indigenous tribal populations as they possess an immense knowledge of their surroundings. Traditional food system plays a significant role in maintaining the well-being and health of indigenous people [5].

2.1 Traditional south and north Indian food with starch content

2.1.1 Rice

Rice (*Oryza sativa* L.) is an important food crop providing nutrients and has been consumed by humans for the last 500 years. Rice is the most common and easily available food resource in India. There are different varieties of rice, and its preparation varies from region to region such as boiled, steamed, fried, flour, paste, etc.

White rice is a cereal grain with the husk, bran, and germ removed, and in North India, it is one of the staple foods. It is a good source of carbohydrates, especially for gluten-sensitive individuals and diabetics.

Black rice is a rare and a very old variety of rice that has been growing in India for centuries. It is mainly grown in the northeast region and the southern parts of India. Black rice is a good source of iron, vitamin E, and antioxidants, and the bran hull (outermost layer) of black rice contains one of the highest levels of anthocyanins [6].

2.1.2 Roti

Roti is Indian bread made from wheat flour, usually prepared on ghee (Indian butter). Usually people of North India prefer roti than rice which is taken with curries or vegetables. It contains gluten.

2.1.3 Dal

Indian legumes (pulses) and Indian dals, viz., chickpea (chana Dal), urad dal (black gram), and masoor dal (red lentils), contain high content of complex carbohydrate with a low glycemic index rating for blood glucose control. It is an indispensable part of a complete Indian dish (Indian thali). Each state of India has its own preference of dal, but the most commonly used are masoor, urad, moong, and chana dal.

2.1.4 Corn

In India, maize stands as the third most important crop after rice and wheat (https://farmer.gov.in/M_cropstaticsmaize.aspx). The major chemical component of the maize kernel is starch, which provides up to 73% of the kernel weight. The starch in maize is made up of two glucose polymers: amylose, an essentially linear molecule, and amylopectin, a branched form. Corn is mainly composed of carbohydrate and fairly high in fiber. Traditionally with the process of corn dry milling, the moist corn granules are turned into products like flakes, meal, and flour. Corn is nutritious, providing fiber, which aids in digestion, plus folate, thiamin, phosphorus, vitamin C, and magnesium.

2.2 Traditional northeast Indian food with starch content

Northeast India is one of the mega diversities of India, where different types of tribes and communities reside together with a unique cultural heritage. Different kinds of unique ethnic foods and recipes are part of cultural identity that has developed through ages [7]. The traditional food of northeastern part of India is connected to the cultural, spiritual beliefs considering life and health of different tribes. Major agro-resources of the northeast are rice, maize, finger millet, soybeans, local varieties of potato, ginger, turmeric, seasonal fruits, edible bamboo shoots, etc.

2.2.1 Cereals

Rice is the staple food of Northeast India. Both the varieties japonica and the indica are found [8]. Joha is scented rice which is very popular in Assam. Either the rice is taken as steam boiled (ukhua) or it can be sun-dried (aaroi). There is also the prevalence of sticky rice (bora) which is mostly prepared during Bihu festivals of Assam. This sticky rice when consumed in high amount works as a sedative, so farmers mostly take it at night after work for a sound sleep. A special rice preparation “pitha” is made during Bihu festival; likewise in Meghalaya “pu tharo,” “pu maloi,” and “pu doh” are some of the indigenous snacks prepared from rice.

2.2.2 Tubers and roots

Tubers and roots (**Figure 1**) contain a significant number of mono-phosphate esters in amylopectin covalently bound to starch [9]. Whereas cereal-starch may be produced throughout the year, starchy tuber and root require production immediately after harvesting. They are the second global source of carbohydrates and play a vital role in human diet [10]. Potato, yam, sweet potato, cassava, and sesuk, are tubers and storage root with rich content of edible starch originated from diverse plant sources.

Potato, after rice and maize, is the most important food crop in terms of consumption. It provides high amount of starch, generally 65–80% [11]. Potato is consumed in the form of curry, fries, mesh potato (aloo pitika), roasted potato (pura aloo), etc. It is so widely used in Northeast India that it almost reached the status of a staple food.

In Assam, a tradition is followed to offer boil yam and sweet potato during one of the Bihu festivals as there is a cultural belief that it will give a better life in the next birth as human. It is also consumed with homemade curd or milk as a sweet dish.

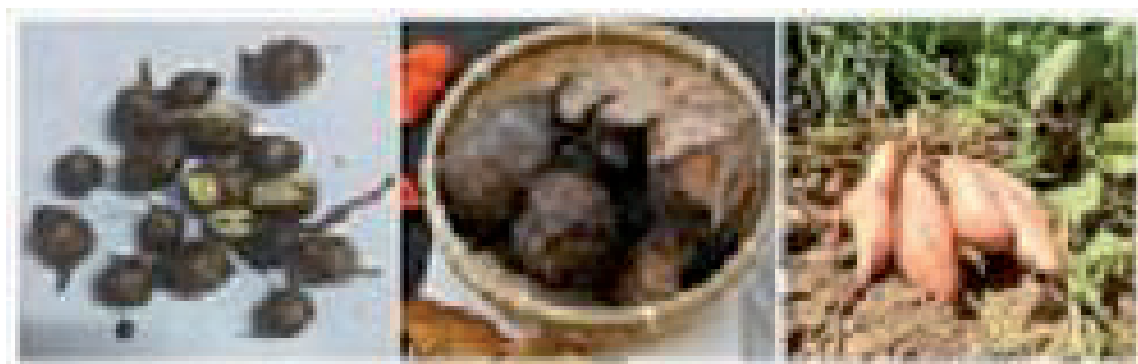


Figure 1.
Locally available tuber sweet potato, sesuk, and yam.

2.3 Common indigenous fermented food containing starch

Fermentation is one of the oldest indigenous forms of food preservation, in which tradition and culture are considered during the preparation. Mostly the preparation is made from local crops, and it varies region to region [12]. Starch is the main carbohydrate from which fermented products are being prepared and has been used for a long time as an effective and low-cost means to preserve the quality and safety of the foods. The fermented foods are better than normal cooked food varieties in terms of nutrition, amenability for digestion, etc.

2.3.1 Cereal-based fermented food

Food is prepared by adding water to cooked rice and incubating the mixture overnight. It is the best remedy for gastritis. In some part of India, the rice is mixed with curd and salt after draining off the water.

Bhatooru, *marchu*, and *chilra* are fermented staple diet of tribal people of Himachal Pradesh prepared using wheat/barley/buckwheat flour [13]. They are taken in baked form or deep fried in oil.

Idli and *dosa* are most commonly used traditional fermented foods of southern part of India. *Idli* is a steamed cake prepared from rice powder and natural black gram dal with the hull removed. Likewise, *dosa* is made from wheat, maize instead of rice as in *idli*. Other fermented foods are *dhokla* and *dosa* where coarsely ground meals of wheat and maize are used for preparation. They should be consumed the same day as the acid content retards the growth of food.

Jalebi is a sweetened fermented product made from wheat flour, maida, mixed with dahi and water. The fermented batter is deep fat fried in oil and afterward immersed in sugar syrup for few minutes. This traditional food is prepared during marriage ceremonies and festivals of South India.

2.3.2 Fermented bamboo shoot

Region wise the preparation and consumption of bamboo shoot vary. Tribal people of eastern Himalayan regions use the fermented bamboo shoot product called *mesu* [14] as pickle and base of curry. In northeastern region, most of the indigenous dishes are prepared with fermented bamboo shoot, which gives odor and sour taste to the food. *Soibum* is an indigenous food of the state of Manipur produced exclusively from succulent bamboo shoots found to be an indispensable part of their diet [15].

In addition to the above, various types of traditional fermented foods like *bhallae* (black gram product), *bhatura* (white wheat flour product), *kulcha* (white wheat flour product), *naan* (wheat flour product), and *warri* (black gram product) are consumed by the people of India. *Hawaijar* is a sticky indigenous food prepared from fermented soybean commonly eaten in Manipur [16]. It is known for its strong flavor and can help in malnutrition. *Hawaijar* is eaten directly or used as a condiment or made into curry. Similarly, *tungrymbai* is also prepared from fermented beans which is one of the most common and mostly used Khasi delicacies which serves as a cheap source of high-protein food in local diet [17].

2.4 Fermented alcoholic beverages

Fermented alcohol like *ghanti*, *jann*, and *daru* popular in Himachal Pradesh and Uttarakhand are prepared from cereals [18]. In northeast region, local beer or wine is prepared from fermented local rice, such as *laopani* or *haanz* (**Figure 2**) by Ahom



Figure 2.
Local rice beer and its preparation (fermented beverage).

in Assam, *Opo* in Arunachal, *chang* a beer made of millet in Sikkim, *Kyat* is the local rice beer popular in Meghalaya. In fact, this beer is also served to gods and goddesses during certain festivals and celebrations.

3. Conclusion


The diversity of indigenous food of India articulates the richness of tradition, culture, belief, and the food availability, but the food system has also undergone changes due to the impact of urbanization, and such kind of undocumented knowledge system is in the verge of extinction. The emphasis should be given for the conservation and documentation of traditional knowledge for the judicious utilization of food related to indigenous people of India.

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