Mini review article

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Probiotic enabled soybean biofortified idly batter – a review

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Abstract

Many people in developing countries suffer from a dangerous form of hunger known as micronutrient malnutrition. The primary underlying cause for the malnutrition is poor diet, high intake of staple food and low consumption of fish, meat products, and fruits and vegetables which have high bio-availability of minerals and vitamins. Such predominant factors can be neglected from the society by including the biofortified foods. One such food which remains as staple in public sector is the idly batter, which brings traditional essence in the daily breakfast and supplies huge nutrient benefits. It is used as staple food mainly because of its sensory attributes, such as mouth feel, appearance, aroma and taste. This review article will briefly describe about the probiotic enabled biofortified food that captures huge attention in recent times; it often permeates lots of health benefits to the undernutrition people.

Keywords

Probiotic; Soybean; Biofortified; Idly batter; Malnutrition

Introduction

Eventhough in the earlier times there were no technologies involved, the nutritional quantity of food was high. But with the advent of many technologies in the recent times, the nutritional quality and quantity of food have gone poorer. As the technology started to develop, the traditional culture also changed, but “idly” as people’s breakfast remained constant. Idly is a traditional fermented food used by people from the olden days. Traditional fermentation of idly involves steaming of fermented black gram (Phaseolus mungo) and rice (Oryza sativa) by naturally fermenting organisms, such as Lactobacillus mesentriodes, Saccharomyces cerevisiae and Pediococcus cerevisiae.[1]

In industrial terms, the conversion of carbohydrate to alcohols, CO$_2$ and other organic acids by the action of bacteria or yeast in aerobic or anaerobic condition is termed as fermentation.[2] But in food technology, fermentation is defined as the process used to convert the complex compounds to simple compounds for increasing the nutritional content of the normal food. Fermentation is the traditional process used not only to prepare the food, but also to preserve and conserve.[3] A fermented food is found to be rich in nutrients than normal food. Because of the taste and nutritional level in the fermented foods, the Indian food varieties are spreading even out of country.[4]

Fermentation of carbohydrate-based batter

In India, steam cooked food is having a great importance owing to its easy digestibility. Traditional fermented foods that are commonly used in India are porridge, curd, cheese, millets porridge, pickles, etc. One of such foods include the traditional South Indian fermented breakfast called idly (rice cake).[5] It is well known that, idly is one of the traditional fermented foods prepared from rice and other cereals.[6] Throughout the world it is used as a dietary source.

Biofortified idly

Idly batter prepared from cereals, such as parboiled rice (Oryza sativa) and black gram (Phaseolus mungo L.) with various compositions give different tastes that are practiced in several parts of India. Parboiled rice is used to decrease the starchy nature of rice. Black gram supplements the sufficient level of carbohydrates. The proteins, such as albumins, globulins and glutalins are present in black gram.[5] Black gram has mucilaginous material, which gives soft texture to the idly. The mucilaginous property is the retention of carbon dioxide evolved during fermentation.[9]

Probiotic enabled food

Probiotics are live micro-organisms that confer health benefits on the host. Probiotics affect the host by augmenting its intestinal microbial population beyond the amount already existing, thus possibly inhibiting the pathogens. Lactic acid bacteria and bifidobacteria are the two probiotic bacteria. These probiotics are Gram-positive bacteria, which act as inhibitors. The role of yeast in enriching the nutrients in the batter has been investigated in many studies.[10] The probiotic yeast called Saccharomyces sp. highly contributes to the aroma, taste and increase in the nutritional content in the prepared carbohydrate-based batter.

The purpose of using Saccharomyces sp. in fermentation is to determine the leavening action in batter. They are non-pathogenic (except in the case of immunosuppressive patients) and temperature tolerant micro-organisms.[11] Saccharomyces sp. possess various health benefits, they can prevent lactose intolerance, urinary tract infections (UTIs), vaginal yeast infections, high cholesterol levels, hives, fever blisters, canker sores and teen-age acne.

Soybeans (Glycin max) as a substrate for biofortification

Soy (Glycin max) ranks the highest among the vegetable protein sources and it is a rich source of protein, fibre and iron (36.5 g, 9.3 g and 15.7 mg per 100 g). Soy is found to be highly rich in unsaturated fatty acids and essential amino acids.[11] The usage of soy in idly promotes the additional value of nutrition.
Soybeans contain protein with good balance of all the essential amino acids and vitamins, especially vitamin A and C, and high percentage of calcium, manganese, iron, zinc, phosphorus, iodine and sulphur.[12]

Some of the health benefits of soy (*Glycin max*) are:

1. Anticancer effects[13]
2. Reduction of menopausal syndrome frequency
3. Osteoporosis protection[14]

**Antinutrients in soybeans**

Antinutrients interfere with the absorption of nutrients in the body.[15] Lectins are the most common type of antinutrients present in beans and wheat that inhibit the digestive enzymes. Soybean seeds are known to contain different proteins showing anti-nutritional or toxic effects, such as soybean agglutins (N-acetyl galactosamine-specific lectins).[16] The natural form of soybeans contains phytochemicals with toxic effects. The three major antinutrients are phytates, enzyme inhibitors and goitrogens. Phytates are the antinutrients which bind to Mg, Ca and P in order to prevent them from absorption of the body.[17] Goitrogens are the antinutrients, which involve in the formation of thyroid cells.[17,18] Unfermented soy is rich in enzyme inhibitors.

**Conclusion**

In order to modify idly, soybeans (*Glycin max*) and probiotic yeast are additionally added with rice and black gram to increase the nutritional content of the traditional idly. The addition of soybeans to rice and black gram will make the idly more nutritional and rich in vitamins, minerals and other essential nutrients. The antinutrient effect present in the soybeans can be removed by soaking, fermentation and boiling. Probiotic micro-organisms in the soy idly help in enhancing the flavour and texture of the idly.

**References**

Learn the benefits of probiotics, and read about side effects, types, and foods that contain probiotics. Find out how to take probiotics. The prebiotic comes before and helps the probiotic, and then the two can combine to have a synergistic effect, known as synbiotics. A prebiotic is actually a nondigestible carbohydrate that acts as food for the probiotics and bacteria in your gut. The definition of the effect of prebiotics is the selective stimulation of growth and/or activity(ies) of one or a limited number of microbial genus(era)/species in the gut microbiota that confer(s) health benefits to the host. Probiotics are a mixture of live bacteria and/or yeast that lives in your body. Probiotics are good bacteria that help keep you healthy. They can be found in both foods and supplements. Good bacteria helps eliminate extra bad bacteria, returning the balance. Probiotic-supplements are a way to add good bacteria to your body. Appointments 216.444.7000. Appointments & Locations. Customer Review: Mood Boosting Probiotic. See full review. Lifted Naturals. Instead, our system considers things like how recent a review is and if the reviewer bought the item on Amazon. It also analyzes reviews to verify trustworthiness. Customer images. a) Soybean seed collection and processing Soybean seeds were collected from Ogige market Nsukka, Enugu state of Nigeria. The seed were processed and fermented for 7 days at 370C. b) Collection of indicator organisms The indicator organisms as Staphylococcus aureus ATCC 12600, Escherichia coli ATCC 117755, Bacillus cerus, Listeria monocytogens and Escherichia coli ATCC 43893 were obtained from the Department of Microbiology, University of Nigeria, Nsukka. c) Isolation and screening for organic acid producing isolates from the fermented soybean The isolation was carried out according to Nakayama