
Health Benefits of Fermented Millet Foods

Ramalakshmi .A^{1*}, Balakrishnan .M², and Amol Vishwas Pawale³

¹ Associate Professor (Agrl. Microbiology), Department of Food Process Engineering, TNAU, Coimbatore, India.

² Professor and Head, Department of Food Process Engineering, TNAU, Coimbatore, India.

³ Department of Agrl. Microbiology, TNAU, Coimbatore, India.

Corresponding author's e-mail: ramalakshmi.a@tnau.ac.in

Published on: November 30, 2024

ABSTRACT

The millets are the renewable source of the all-essential nutrients and mineral that are necessary part of the human's functional health. Millets are a traditional staple food that consumes dominantly as standard diet in the dry land regions (mostly semi-arid tropical regions of Asia and Africa) of the world. Sorghum, Pearl millets, Finger millet, Foxtail millet, Common millet, little millet, Barnyard millet and Kodo millets and other minor millets included in millets group. Among the minor millets, finger millet, proso millet, and foxtail millet considered more importance. In most of the under developed nations, nearly all millets are consumed by humans; while, in wealthy nations, its main application has been as animal feed. In addition to the nutritional disadvantages of dairy products, like their high cholesterol and lactose content and the global predominance of gluten & lactose intolerance to dairy-based products, plant-based diets that connect environmental sustainability to human health have been created a market for such plant-based products. Hence the fermented millets foods, their bioactive ingredients, and the bacteria that surrounds them, all of which may enhance human health.

INTRODUCTION

Millets are a traditional staple food of the dry land regions of the world. Millets account for 10% of India's food grain basket and are produced on around 17 million hectares of land annually, yielding 18 million. Sorghum, Pearl millets, Finger millet, Foxtail millet, Common millet, little

millet, Barnyard millet and Kodo millets and other minor millets included in millets group. These nutri-cereals are well-known for their high nutrient content, which contains minerals like calcium, iron, zinc, potassium, and magnesium as well as vital fatty acids, dietary fiber, protein, and B vitamins. They provide health advantages such as lowering blood sugar levels (diabetes), controlling blood pressure, and assisting with thyroid, cardiovascular, and celiac disease issues. Phytochemicals that are good for health, such as phytosterols, phyto-oestrogens, lignans, polyphenols, and phytocyanins, are abundant in millets. Due to their anti-oxidant, immunomodulatory, detoxifying, anti-inflammatory, and other properties, they guard against age-related degenerative illnesses include cancer, diabetes, celiac disease, and cardiovascular disease.

High fiber content and the presence of some antinutritional elements have an impact on the minerals' bioavailability of the millets. The presence of anti-nutritional factors in millets can also bind to proteins, leading to a reduction in digestibility and low nutritional availability which decreases their food value. The bioavailability of the minerals like iron, zinc etc, and the help in digestibility should be enhanced through processes includes germination, malting, fermentation and other. Since past three decades, the direct consumption of millets as food have significantly declined due to the lack of awareness of nutritional merits, inconveniences in food preparation, lack of processing technologies, and also the government policy of disincentives towards millets and favoring of supply of fine cereals at subsidized prices. So, its necessity to refocusing efforts on the millet crop in order to create demand for processed meals with added value through technological diversification, nutritional analysis, and awareness-raising supported by backward integration. Since probiotics have the capacity to improve health, provides the host with health advantages beyond those of basic diet. Conversely, prebiotics are indigestible dietary elements that work by specifically influencing the proliferation and/or activity of a single or small group of beneficial bacteria in the colon. As a result, they can enhance the host's health and increase the minerals' bioavailability. The bioavailability of the nutrients, elimination of toxic compounds and removes or reduces the levels of antinutritional factors should possible by the fermentation by effective microorganisms. During fermentation, optimal pH conditions prevail for enzymatic degradation of the antinutritional factors which results in better bioavailability of minerals such as iron, zinc and calcium.

Table 1. Beneficial effects of the LAB strains on the various millets

Millets	Lactic Acid Bacteria	Benefits
Finger Millet	<i>L. plantarum</i> , <i>L. lactis</i> ,	<ul style="list-style-type: none"> • Acclimatize to gastric condition • Effective against drug-sensitive and multidrug-resistant pathogens
Proso Millet	<i>L. fermentum</i> , & <i>L. plantarum</i>	<ul style="list-style-type: none"> • waxy starch fermentation • Tannins contents, phytic acid lower down • boost total polyphenol • release of antioxidant and bioactive compounds

Barnyard Millet	<i>L. plantarum</i>	<ul style="list-style-type: none">• enhance Fe & folate, Ca, Zn• boost up total phenol content TPC
Kodo Millet	Lactobacillus and yeast	<ul style="list-style-type: none">• Secretion of bioactive polyphenol• Rheology modification• enhanced protein content• lower down fat• hydrolysis of fibre, ash, carbohydrate
Sorghum	<i>Leuconostoc lactis</i> , <i>Lactiplantibacillus</i>	<ul style="list-style-type: none">• Hydrolysis of phytic acid
Pearl millet	<i>Leuconostoc mesenteroides</i> , <i>Pediococcus pentosaceus</i>	<ul style="list-style-type: none">• anti-inflammatory and anti-pathogenic properties

CONCLUSION

The effective potential probiotic and prebiotic lactic acid bacteria should transform the millets into the functional food by optimizing the parameters and boosting the gut health and immunity by enhancing the bioavailability of the nutrients, elimination of toxic compounds and reduces the levels of antinutritional factors.