

## Mighty Millets: Bespoke for Multi Nutrients

Abstract:

Millets are nutritionally comparable and even considered superior to main cereals in terms of providing protein, micronutrients, and phytochemicals. Pearl millet is a food, and many rural food preparations, especially products, use it as a staple crop. Pearl millet (bajra in India) is one of the most widely grown tiny millets. Millets may prove an economical solution to the country's food and health problems in today's changing lifestyle and developing health challenges. Due to their high tryptophan and magnesium content, millets soothe our moods and lessen migraine and heart attack risk, according to the Indian Institute of Millet Research. India produces the most millet and exports the fifth-most. Millet exports are booming as demand rises. Millet's demand is expanding business prospects.

Keywords: micronutrients, Pearl millet, food security, dietary fiber

### Introduction

Different millets are eaten. Ragi, the most common millet, is nutrient-rich. High in fibre, calcium, phosphorus, and iron. Pearl millet makes dosa, cereal, laddus, and more. Millets are good for diabetic weight loss and wheat allergies/intolerance. Millet-based products increase rural and urban acceptance. This helps producers and processors create a sustainable ecosystem.

Sorghum and other millets including pearl millets, finger millets, kodo, proso, foxtail millets, tiny, and barnyard millets are significant for health (Fig.1). Millets flourish in low-rainfall areas where agriculture and food security are important. Most developing countries utilise millets for human food, although some use them for animal feed. Millets provide protein, phytochemicals, and minerals. Pearl millets have 5-8% protein, 65-75% carbohydrate, 15-20% fibre, and 2.5-3.5% minerals (Chethanand Malleshi, 2007a). Whole millet and its products have been found to reduce the risk of diabetes, cardiovascular disease, and gastrointestinal disorders (Mckeown, 2002). Millets contain minerals, phenolic compounds, dietary fiber, and vitamins in their outer layer (Antony et al., 1996).

Noodles were ancient staples in many countries. Nearly 4000 years old. China introduced a pot of thin noodles comparable to la-Mian, Chinese noodles developed through stretching and hand-pulling the dough (Lu *et al.* 2005). Technological advances, eating habits, health consciousness, regional diversity of raw material, and flavour preferences have changed the formulation of noodles, over the time making them the world's most popular snack. Noodles can be produced from wheat, rice, potato-starch, pulses, millets, and other grains. Raw noodle quality is determined by colour, appearance, and processing. Sheeting and cutting machines make noodles from wheat flour, millets, pulses, water, and salt. Noodles must taste, feel, and look excellent. Noodles need gluten and wheat flour with strong starch swelling and pasting capabilities (Fu 2008).



Fig.1. Millets grown in India

### **Ready To Eat (RTE) Foods:**

Due to their versatility, content, and ease of preparation, ready-to-eat foods are popular in developed countries. Ready-to-eat foods are big business. Medium and small companies make quick noodles. Noodles are also popular in fast food chains. India loves noodles, a pasta. Maggie introduced easy-to-prepare products to most metropolitan families.

### **Current trends**

Sorghum, finger millet, pearl millet, and others are millets. Over 32 million hectares of dry, semi-arid, and subhumid agriculture can grow millets. India produces most millet. The FAO forecasted global millet production at 28.33 MMT in 2019 and 30.08 MMT in 2021. Millet production is 6–7 lakh tonnes in 2023.

### **Healthy food market trend**

The oats market is predicted to expand 3.85% from 2023 to 2028 to 34.69 million tonnes by 2028. This industry will benefit from global health awareness and lifestyle changes. Due to its high fibre, vitamin, and mineral content and portability, "oatmeal cookies" are the most popular healthy snack. Low-fat oatmeal cookies are predicted to expand due to growing awareness of healthy snacking.

### **Sorghum baby food**

Drum-dried sorghum/millet milk powder baby food contains safe protein for children over one month. Commercial sorghum/millet baby food makers can use this formulation and processing such as sorghum porridge (Fig. 2). Rising disposable income, demand for ready-to-eat products, health consciousness, product benefits, and the launch of diverse oat-containing producers drive the market (Anderson and Bridges 1993; Wrick 1993; 1994; Stark and Madas 1994). The change from dairy products to oat milk will define global growth.



Fig. 2. Sorghum porridge

## **Millet importance**

Millets, the first domesticated grain, are grown in 131 nations. Millets are grain crops grown mostly on marginal land in arid areas. Millets, high-energy nutri-cereals, were domesticated 10,000 years ago. They are grown in marginal, degraded ground with low rainfall and soil nutrients. Finger, pearl, foxtail, barnyard, proso, kodo, and small millets are grown worldwide.

Millets are the future crops that can address the issues like food, feed, fuel, malnutrition, health, and climate change because they are adapted to a wide range of ecological conditions, require less water, and input, and grow well even in infertile soil. They are rich in dietary fibre, antioxidants, minerals, phytochemicals, polyphenols, and proteins that fight health-related disorders/diseases. Several private and government agencies have invested huge amounts in millet production and their utilization for the formulation of different food products. The low glycemic index of millet helps manage diabetes, while its high fibre content aids digestion and prevents constipation.

## **Millet health benefits**

Millets are nutritionally comparable and even considered superior to main cereals in terms of providing protein, micronutrients, and phytochemicals. Their fewer cross-linked extended chains may help digest millet protein. Millets may reduce the risk of heart disease, diabetes, and some metabolic syndrome by detoxifying the body, boosting the immunity, enhancing the respiratory health, energy levels, and muscular and nervous system .

## **Pearl millet**

Bajra is pearl millet (*Pennisetum glaucum*). It is a tropical semi-arid cereal cultivated in Africa and Asia. Pearl millet is predominantly a food crop (Suma, 2012). Pearl millet, the fourth most significant cereal after wheat, rice, and sorghum, provides the rural Indian population with 360 kcal/kg of dietary energy. Pearl millet provides ample amounts of protein, calcium, phosphorus, and iron. Pearl millet is rich in thiamine (B<sub>1</sub>), riboflavin (B<sub>2</sub>), and niacin (B<sub>6</sub>). A lot of pearl millet grain is also utilized for livestock feed, poultry feed, and alcohol extraction (Basavaraj et al., 2010). Whole grain cereals have the most energy (784cal/kg) Pearl millet has more protein and fat than sorghum. (Yawatkar *et al.*, 2010).

## **Pearl millet health benefits**

- Pearl millet flour controls glucose receptors due to its high magnesium content. Fiber-rich foods aid digestion.
- Pearl millet prevents flatulence, stomach pain, cramps, ulcer, acidity, inflammation, and colon cancer.
- Protein in pearl millet helps cells and muscles develop and regenerate. It also prevents ageing muscle deterioration.

## **Indian millets output and consumption**

About 50 years ago, India and many other countries consumed millets. According to the National Council of Applied Economic Research (NCAER), millets have lost their significance share of plates to wheat, rice, and other processed cereals. Due to increased land use for wheat and rice production, millet cultivation has decreased significantly by 58% for small millets, 64% for sorghum, 49% for finger millet, and 23% for pearl millet since 1956.

India produces the most millet and exports the fifth-most. Millet exports are booming as demand rises. Millet's demand is expanding business prospects. In 2021, the millet market was worth over USD 9 billion and is projected to rise by 4.5% to over USD 12 billion by 2025.

Indian households are eating less millets. From 1970 to 2020, millets per capita dropped from 32.9 kg to 4.2 kg (A Large-Scale Survey, 2021).

### **Haryana pearl millet**

In the last three years, Haryana produced 11.77 lakh tonnes of millet, ranking fourth in the nation. With the increase in holding size, livestock consumption accounts for 54.15 and 51.63 percent of total consumption in Mahendragarh and Bhiwani districts, respectively, followed by family consumption at 30.68 and 30.69 percent.

### **Millet need**

Pearl millet is a food, and many rural food preparations, especially products, use it as a staple crop. Pearl millet (bajra in India) is one of the most widely grown tiny millets. Pearl millet outperforms rice and wheat in mineral and vitamin content and protein (6-8%) and fat (1-2%). Many people get their carbs from it.

Millets are too rudimentary to use. Millet's output and consumption have decreased. This depleted vital elements in our diets. India leads millets production and export. Rice and wheat flour have replaced millets, reducing production and export to 20%. Millets may prove an economical solution to the country's food and health problems in today's changing lifestyle and developing health challenges. Due to their high tryptophan and magnesium content, millets soothe our moods and lessen migraine and heart attack risk, according to the Indian Institute of Millet Research. They are gluten-free, nonallergic, abundant in protein, antioxidants, and cholesterol-lowering.

### **Pearl Millet:**

Bajra, or pearl millet, is a very nutritious and easy-to-digest cereal grain. It is gluten-free and healthy for people suffering from celiac diseases. They are loaded with carbohydrates, minerals, vitamins like folic acid, niacin, thiamine, riboflavin and beta carotene.

### **Per 100 gm of pearl millet contains-**

- Energy – 348 kcal
- Protein – 10.96 gm
- Carbohydrate –61.78 gm
- Fat contents –5.43 gm
- Dietary fibers – 11.49 gm

### **Pearl millet health benefits**

1. Pearl millets are good for diabetics since their carbohydrate is slowly absorbed. This makes them diabetic-friendly.
2. These grains are high in fibre and cholesterol-lowering.
3. Perfect for celiac illness and gluten intolerance—pearl millet is gluten-free and readily tolerated by everyone.
4. Pearl millets are one of the few foods that reduce stomach acidity, preventing ulcers and discomfort from recurrent acidity.
5. Prevent constipation—Pearl millet promotes intestinal health. Pearl millets prevent constipation. Because pearl millet has insoluble fibre.
6. Vegetarians cannot acquire enough protein from meat and fish. Pearl millet provides vegetarians with protein and other health advantages. Pearl millet flour is complete with seeds like rajma, moong dal, chana dal, etc.
7. Pearl millet's potassium content lowers blood pressure. Potassium-rich meals wash out salt, lowering blood pressure.

8. Pearl millet's phosphorus content strengthens bones.
9. Dietary fibres bulk up and relieve constipation.
10. Pearl millet is beneficial for high cholesterol sufferers since it has enough healthy fat.

### **Millet-based products:**

#### **Millet bread/bun**

Bread is made by mixing flour, water, oil, salt, and yeast into dough and baking it into a loaf. IIMR (Indian Institute of Millets Research) makes millet breads by replacing 50% wheat flour with pearl millet flour, finger millet flour, or foxtail millet flour and adding the yeast, trans-fat free oil, salt, and sugar. Bread was prepared from proofed dough. Buns were prepared from dough balls (Fig 3).



**Fig. 3.** Millet bread

#### **Technology/product advantages**

Fiber-rich millet bread benefits all ages.

Breakfast meal.

- Magnesium, zinc, iron, protein, and fibre are abundant.
- It lasts 6 days in LDPE packets.

#### **Millet cake**

Cake is made by blending flour, sugar, fat, eggs, and flavourings into dough and baking it. At IIMR (Indian Institute of Millets Research), millet cakes are made with 100% pearl millet flour, finger millet flour, or foxtail millet flour, high-quality vegetable oil, sugar, eggs, and chocolate or vanilla essence. out of all, Finger millet cake was best (Fig. 4).



**Fig. 4.** Barnyard millet cake

#### **Advantages and uniqueness of technology/product:**

- Millet cake is rich in fibres and its beneficial for all age groups.

it can be used as snack food or breakfast food

- Millet cake is rich in magnesium, zinc, iron, dietary fibre, and protein.
- It has a shelf life of 5 days when packed in packets.

#### **Instant millet laddu Mix**

- Indian laddu is a ball of flour/semolina, powdered low-calorie sugar, and shortening.
- Roasted sorghum, fine raw finger millet flour, pearl millet flour, powdered low-calorie sugar, dry fruits, and cardamom make millet laddu mix (Fig. 5).
- Combine this with ghee or milk to create balls before serving.
- The mix was packaged.

#### **Technology/product benefits:**

1. Instantly flavour laddus.
2. Gluten-free and celiac-friendly.
3. High phenolic content and satiety reduce digestibility.
4. Reduce oxidative stress.
5. Dietary fibre and low-calorie sugar aid digestion.
6. Three months shelf life at ambient temperature.



**Fig. 5.** Finger millet laddus

#### **Sorghum energy bars**

Sorghum flakes and broken flakes add energy bars. Bran is carefully pulverised and dried to remove moisture. Honey syrup was added to bind and sweeten bran and flakes. It provides clean energy (Fig. 6).



**Fig. 6.** Sorghum energy bars

#### **Millet's health benefits**

Millet, a nutritious whole grain, has been eaten worldwide for millennia. A balanced diet with it has several health benefits.

### **Health benefits of millet-based foods:**

1. Millet contains carbs, protein, vitamins, and minerals. These nutrients support body function and wellness.
2. Millet is gluten-free, making it a good grain for celiacs. It can replace wheat, barley, and rye in recipes, providing gluten-free options.
3. Dietary fiber in millet promotes digestion and prevents constipation. Fibre bulks stool, promoting regular bowel movements and intestinal health.
4. Pearl millet has a low glycemic index which helps to manage blood sugar levels in diabetes patients and in those trying to control their blood sugar.
5. Bone health: Magnesium, phosphorus, and calcium are found in millet. These minerals help build bones and prevent osteoporosis.
6. Pearl millet strengthens muscles and memory.
7. Whole grains like bajra may prevent diabetes, heart disease, and cancer.
8. Pearl millet may provide further health benefits.
9. Bajra has 1.2 cal/g. Thus, low-calorie meals like bajra may help weight loss.
10. High-fiber foods, such as pearl millet, have also been linked to better type 2 diabetes and chronic illness management.

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