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## Awareness and consumption of small millets

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### Abstract

Millets are one of the underutilized groups of cereal grains. The millet is highly nutritious and contains important amino acids and also has several health benefits such as anti-diabetic, anti-tumorigenic and atherosclerogenic effect. Millets are considered as rich source of energy, carbohydrate and protein and are comparable to other cereals but have more fat, calcium, iron, dietary fibre and Vitamin E content. Researches have reported that the presence of dietary fibre and phenolic compounds help in the prevention of many diseases such as diabetes, cardiovascular diseases and cataractogenesis. In spite of all these aspects consumption of millets has decreased from last two to three decades.

**Keywords:** Millets, nutrients, consumption pattern, health benefits, antioxidants

### Introduction

The term millet is derived from the French word “mille” which means thousand, with a handful of millet containing up to 1000 grains (Shahidi & Chandrasekara, 2013) [14]. Millets are one of the cereals aside the major wheat, rice and maize. They are grown mostly in marginal areas under agricultural conditions in which major cereals fail to give substantial yields. Millets are one of the oldest foods known to humans & possibly the first cereal grain to be used for domestic purposes. Millets are small-seeded grasses that are hardy and grow well in dry zones as rain-fed crops, under marginal conditions of soil fertility and moisture. Small millets are one of the important food groups that had been moved out of the food basket in recent firms (Kalaiselvi *et al.*, 2016) [6].

India is the largest producer of many kinds of millets, which are often referred as coarse cereals. However, realizing the nutrient richness of these grains they are now considered as nutria-cereals (Stanly and Shanmugam, 2013) [16]. Reddy, 2017 mentioned in a study that “Millets are the neglected ancient grain cereals which are re-introduced as 21<sup>st</sup> century smart foods to build a global healthy society”. Millets are highly nutritious, non-glutinous and not acid forming foods, hence they are easy to digest. They are considered to be the least allergenic and most digestible grains available. Millets contain about 8 per cent protein and 4 per cent fat. They are rich source of vitamins and minerals. Millets are especially rich in calcium. The dietary carbohydrate content of millets is also relatively high. Although a considerable portion of nutrients is concentrated in the seed coat, the bioavailability of the nutrients present in the endosperm is higher than the seed coat nutrients. Anti-nutritional factors such as phytate and polyphenols are also present in millets but they are mostly confined to the seed coat and the milled millets are generally free from the anti-nutritional factors. (Kumar, 2010) [8].

### Importance of millets

The rice eater is weightless like a bird; the one who eats Jowar is strong like a wolf: one who eats Ragi remains ‘nirogi’ (illness free) throughout his life - An old Kannada saying. India is on the threshold of discussing the Food Security Bill which will have far reaching implications for the poor and the marginalized, in their struggle to access food and nutrition lead a dignified and healthy life. There is a need for awareness regarding this power house is very important. They also come with antioxidants, flavonoids, certain amino acids and tryptophan (The Economics Times, 2016).

The ICAR-Indian Institute of Millets Research, Hyderabad and Multi-Technology Testing Centre & Vocational Training Centre, College of Fisheries, Central Agricultural University, Imphal organized an Awareness Programme on “Health benefits and cultivation of Nutri-cereal (Millets)” under the North-Eastern Hills Project of ICAR-IIMR, Hyderabad. The participants were made aware to include millets in their diet due to its numerous health benefits (13<sup>th</sup> April, 2021, CRPF Camp Lembucherra, Tripura).

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Millet Network of India has for long, taken the stand that we as a nation, should not just be settling for food security; we should be striving for food sovereignty. This implies that we focus on giving the control over the production, distribution and consumption of food back to the people. One of the steps in doing this would be to bring millets back into the food security debate; for millions of households in the dry land and hilly regions of the country depend on these crops to meet their food needs. Introduction of millets into the public distribution system and into government food programmes like the mid-day meal scheme is important to achieve the aim of food sovereignty. The recent Global Hunger Index ranks India 64 out of 81 nations. Further, India ranks second in the incidences of malnutrition among children. This is happening despite the universal public distribution system that we have been following for decades. The PDS is laudable in its intention, and no one can dispute the great service that it has been rendering in helping the poor and the marginalized households in meeting their food and nutrition needs (Stanly and Shanmugam, 2013) [16].

The consumption of millets in India gradually decreased in an alternative years of 2005-2008 & 2009 onwards it was increased but in the year of 2012 onwards it came to falling. Low productivity, high labour intensity, drudgery of agricultural operations and lack of alternative farm gate prices, easy availability of rice and wheat through public distribution system, inadequate investment in product development and commercialization, inadequate availability of small millets in local markets and high prices, inadequate policy support for small millets when compared to crops like rice and wheat, were the reason for decline of millets.

## Objectives

1. To analyze the nutritional quality and health benefits of millets in North Coastal Zone
2. To identify the consumption pattern of millets and reasons for their decline
3. To find out the advantages of millets for consumption

## Nutritional properties of millets

Millets are unique among the cereals because of their richness in calcium, dietary fibre, polyphenols and protein (Devi *et al.*,

2011) [5]. Millets generally contain significant amounts of essential amino acids particularly the sulphur containing amino acids like methionine and cystine, they are also higher in fat content than maize, rice, and sorghum (Obilana and Manyasa, 2002).

Pearl millet and little millet are high in fat, while finger millet contains low fat. Barnyard millet has a higher straw yield and fodder value even at multiple cuttings (Bandyopadhyay, 2009) [1]. The fodder is about 6.3 tons/ha. Fodder contains a good amount of protein (7.6%), digestible fiber (23%), ash (12%) and fat (2.0%). Besides its superior feed quality, higher digestibility and nitrogen concentrations have meant barnyard millet is used as a potential livestock feed crop in the dry areas of the Deccan plateau to the extreme hills of the temperate sub-Himalayan region (Vanniarajan *et al.*, 2018) [17]. Brown top millet is not only nutritious but also very delicious. The millet is gluten free and rich in essential nutrients. It is a rich source of natural fibre, when compared to other grains. Its high fibre content serves as medicine for dealing with lifestyle diseases. Lower incidence of cardiovascular diseases, duodenal ulcer and hyperglycemia are reported among those who regularly consume millets. Brown top millet is also grown and consumed in limited quantities in north central India (Reddy and Prasad, 2017) [11]. Millets are also relatively rich in iron and phosphorous. The bran layers of millets are good sources of B-complex vitamins like niacin, vitamin B6 and folic acid. Among all the millets finger millet has the highest calcium content. They also have high fibre content and poor digestibility of nutrients, which severely limit their value in nutrition and influence their consumer acceptability. Millets have high therapeutic value and can be used in the management of many life style diseases like diabetes mellitus, cancer and heart diseases (Reshma and Nandini, 2013) [12].

Small millets namely Brown top millet (BTAVT6), Barnyard millet (VMBC331), Foxtail millet (SIA-3022), Proso millet (CO5), Little millet (OLM-203), Kodo millet (CO3) and Finger millet (VR-847) were analyzed for their nutritive values such as ash, moisture, protein, fat, crude fibre, energy, iron, zinc and calcium. The nutritive composition of millets were presented in Table 1.

**Table 1:** Nutritive composition of millets

Name of the millet	Ash (%)	Moisture (%)	Protein (%)	Fat (%)	Crude fibre (%)	Energy (kcal)	Iron (mg)	Zinc (mg)	Calcium (mg)
Brown top Millet (BTAVT6)	8.62	7.32	11.64	5.28	16.08	362.64	178.54	66.10	3266.27
Barnyard Millet (VMVC331)	6.15	7.78	10.29	3.87	14.07	363.63	163.50	47.64	2661.68
Foxtail Millet (SIA-3022)	2.95	7.69	14.00	4.46	10.53	357.44	99.30	53.60	737.50
Proso Millet (CO5)	5.05	8.85	11.06	2.05	14.91	354.65	158.92	44.12	2649.14
Kodo Millet (CO3)	3.03	8.06	8.38	3.42	14.94	372.74	206.5	36.30	2724.76
Little Millet (OLM-203)	4.77	8.56	8.94	3.10	7.40	362.18	109.94	33.02	1894.66
Finger Millet (VR-847)	3.62	7.68	7.3	1.3	3.9	351.92	35.50	24.70	3811.98

## Health benefits of millets

### Millets - obesity

Obesity is the biggest emerging problem in India and it is associated with several chronic diseases including diabetes and CVD. Recent studies show that intake of high dietary fibre decreases the incidence of obesity. Foods rich in dietary fibre improves the bowel function and slows the process of digestion and absorption, thereby reducing the risk of chronic diseases.

The dietary fibre content present in millets is 22% which is

comparatively higher than other cereals like wheat and rice. Shobana *et al.* (2007) [15] has reported that finger millet is having 22% total dietary fibre, 19.7% insoluble dietary fibre and 2.5% soluble dietary fibre. Millets help in satiating hunger satisfaction and helps in management of obesity.

### Millets - diabetes

Millets reduces the  $\alpha$ -glucosidase and pancreatic amylase thereby reducing the postprandial hyperglycemia by reducing the enzymatic hydrolysis of complex carbohydrates. Hence

consuming millets helps in controlling the blood glucose levels (Rajasekaran *et al.*, 2004) [10].

Millets help in prevention of type II diabetes due to their significant levels of magnesium. Magnesium is an important mineral which helps in increasing the efficiency of insulin and glucose receptors by producing many carbohydrate digesting enzymes, which manages insulin action.

### **Millets - cardio vascular diseases**

Millets are rich source of magnesium, which is an important mineral for reducing blood pressure and the risk of heart attacks, particularly in the case of atherosclerosis. Millets are also a great source of potassium, which further keeps blood pressure low by acting as a vasodilator. Reducing the blood pressure and optimizing the circulatory system is one of the best ways to protect cardiovascular health (Kimeera and Sucharitha, 2019) [7].

Millets are also rich in phyto-chemicals which contains phytic acid helping in lowering cholesterol and preventing cardiovascular disease by reducing plasma triglycerides (Lee *et al.*, 2010) [9]. Studies suggested that regular consumption of whole millet grains reduces the risk of CVD.

### **Millets - cancer**

Millets are rich in phenolic acids, phytates and tannins which are the anti-nutrients that help in reducing the risk for colon and breast cancer.

### **Millets - celiac disease**

Celiac disease is a genetically susceptible problem triggered by the consumption of gluten. As the millets are gluten free, they help in reducing the celiac disease by reducing the irritation caused by the common cereal grains which contain gluten (Saleh *et al.*, 2013) [13].

### **Millets - phytochemicals**

Millets are good source of phytochemicals and micronutrients. Phytochemicals like phenolics, sterols, lignans, resistant starch,  $\beta$ -glucan, phytates, tocopherol, dietary fibre and carotenoids are present in millets. The polyphenols are the phenolic acids and tannins, flavonoids are present in small quantities, which act as antioxidant and play a role in protection of body's immune system (Chandrasekhara *et al.*, 2010).

### **Millets - development and repair of body tissue**

Millets contain phosphorous that play a role in the structure of every cell in the body. In addition to its role in forming the mineral matrix of bone, phosphorous is an essential component of numerous compounds including adenosine triphosphate (ATP), the molecule that is the energy currency of the body. Phosphorous is an important component of nucleic acids, the building blocks of the genetic code. In addition to the metabolism of lipids, phosphorous is an essential component of lipid-containing structures such as cell membranes and nervous system structures.

### **Consumption pattern of millets**

Sorghum and other millets are the staple food of western and central regions of Maharashtra and northern region of Karnataka and Andhra Pradesh. The annual per capita consumption of sorghum is declined by 75% in urban areas and 87% in rural areas during 1972-73 to 2011-12 (Dayakar *et al.*, 2018) [4].

In the last two to three decades millet grains especially sourced from kharif season are diverted to industrial uses such as livestock and poultry feed, starch, potable alcohol and ethanol production due to poor quality and mould affected grains. The declining trend in consumption of millets in general is attributed to the shift in dietary patterns of consumption towards a balanced diet that includes livestock products, fruits and vegetables (Chand, 2007) [2] which is mainly driven by an increase in income and urbanization wherein people are too busy to spend much time in preparation of their daily diet. Secondly, the shift is due to the consumption of fine cereals which are supplied through PDS at subsidized prices.

### **Reasons for decline in millets**

The main reasons for decline in production of the millets crops in India are low remuneration as compared to other competing crops, lack of input subsidies and price incentives, subsidized supply of fine cereals through PDS, and change in the consumer preferences (NAAS, 2013). These factors had led to shift from production of millets (jowar in particular) to other competing crops such as soyabean, maize, cotton, sugarcane and sunflower in the country as a whole. The reasons for decline in millets are presented in Table 2.

**Table 2:** Reasons for decline in millets

S. No.	Demand side factors	Supply side factors
1.	Rapid urbanization	Increasing marginalized cultivation
2.	Changing consumer tastes and preferences due to rising per capita incomes	Low profitability low remuneration for millets
3.	Government policies favoring other crops such as output price incentives and input subsidies	More remunerative crop alternatives in kharif competing with millets in question
4.	Supply of PDS rice and wheat at cheaper price introduced in non-traditional areas of fine cereals.	Decline in production and quality
5.	Poor social status and inconvenience in their preparation	Lack of incentives for millet production
6.	Low shelf-life of grain and flour	Development of better irrigation infrastructure/options as in small millets

### **Advantages of millets**

Millets are cooked as rice after dehulling. In addition, Italian millet is consumed as stiff porridge called sargatic or as an leavened bread known as roti, after the dehulled grain has been milled into flour. Proso millet flour is also used as a substitute for rice flour in various snack foods. Millet protein lacks gluten, hence it is unsuitable as the sole material for

preparation of bakery products. Millet flours are soaked overnight in cold water containing a little butter milk and the slurry after fermentation is used to prepare porridge. Millets and black gram mixed in the ratio of 3:1 are wet ground and fermented overnight which can be steamed to make idli or baked on hot pan to prepare dosa or wet pan cakes.

Non-conventional foods like flakes, extruded products or by

par boiling of millets, popping and malting, products can be prepared from millets. Flakes are prepared by soaking pearled millets in water and then steamed under pressure for complete gelatination of the starch and dried to about 18% moisture. Then they are pressed to requisite thickness between heavy duty rollers and dried to prepare flakes which hydrate quickly when added to warm water or milk. Noodle like products can be prepared from millet flours. They form nutritionally balanced food which is used as supplementary or weaning foods (Stanly and Shanmugam, 2013) [16].

## Conclusion

Millets are still staple food for millions of poor people in Africa and Asia. Combination of millets with other sources of protein would compensate the deficiency of certain amino acids such as lysine. Production of millets has numerous securities, such as securities of food, nutrition, fodder, fibre, health, livelihood and ecology. Millets are storehouse of dozens of nutrition in large quantity and long term consumption of millets may bring several health benefits of the people. Hence awareness about the inclusion of millets in our millets in our daily meals for healthy living to combat the effects of sedentary lifestyle is needed.

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