

Role of Millets for Ensuring Health and Nutritional Security in India

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Abstract

India food security was mainly depended on rice followed by wheat. Nowadays, peoples are concerning more about nutritional security; hence the millets are the next important source on the basis nutrition. Millets are rich in macro and micronutrients, vitamins and minerals, antioxidants *etc.*, thereby it could be popularized in developing countries to treat the various diseases, providing the essential nutrients and satisfying the food demand especially in India. It could be performed well in adverse climatic condition and mostly grown in rainfed region which covers more area in Indian agriculture system.

Keywords: India, food demand, millets, nutritional security

Introduction

Millet refers to a group of small-grained cereal grasses. It categorised into major millets, such as sorghum (cholan), pearl millet (cumbu) and finger millet (ragi) and minor millets, such as barnyard millet (kudhiraivali), foxtail millet (thenai), kodo millet (varagu), proso millet (panivaragu) and little millet (samai). It is also known as nutri-grains because they are rich in micronutrients, minerals and B-complex vitamins. They are believed to treat the diabetes, ageing, cancer, celiac disease and cardiovascular disease (Bhat *et al.*, 2018). It has abundant health promoting phytochemicals and could be consumed as functional foods. It could perform well even in mixed cropping with vegetables and pulses. Though the India is a largest producer as well as consumer of millets that contributes more than 40% of global millet consumption yet it has never risen to the top of the national food and agricultural policies (Konapur *et al.*, 2014).

Millets have the promise not just for food security as well as for nutritional security in India due to their hardiness and ability to grow in rain-fed regions. In India 60% of cultivated lands are under rainfed condition. It has unique molecular, biochemical, and morpho-

physiological traits that enable them to tolerate challenging environmental factors, such as drought and adverse soil conditions (Bandyopadhyay *et al.*, 2017). They may also have an advantage due to their shortened lifetime, limited leaf surface area, and short stature. Millets are more effective than common cereal crops when compared to their ability to withstand high light, high temperature and dry weather, C4 photosynthetic potential, effective use of water and nitrogen. Even though millets have a myriad of benefits, the area was being grown in pure stands is limited. As a result, current agricultural system has focused on reviving millets in India. In this concern, 2023 is announced as an international year of millets.

Millets: An approach for sustainable and healthy nutrition

Millets, which have long been a traditional staple crop for millions of farmers, especially in India, China, and Nigeria. Millets are equivalent or superior than other major cereal grains in terms of nutrients. The additional advantages of millets are their high fibre content, low glycaemic index and richness in bioactive chemicals, making them an ideal health food. The average protein content of millets 10-11% (Panghal *et al.*, 2006) expect finger millet that contains in the range of 4.76 to 11.70 g/100 g (Singh and Raghuvanshi, 2012). Millets are rich in β -carotene and B vitamins, notably riboflavin, niacin, and folic acid comparable to rice and wheat. It has antioxidant properties that enable them to provide a balanced diet and are very nutritious (Mishra *et al.*, 2014). Foxtail millet has the highest thiamine concentration with 0.60 mg/100 g. The riboflavin level of millets is several times higher than the staple cereals, with barnyard millet having highest content of riboflavin as 4.20 mg/100 g) followed by foxtail millet (1.65 mg/100 g) and pearl millet (1.48 mg/100 g) (Kumar *et al.*, 2018). Finger millet protein is abundant in essential amino acids such as methionine, valine, and lysine, and 44.7% of the amino acids (Mbithi-Mwikya *et al.*, 2000).

India is the world leading producer of minor millets, yet the awareness on its significance and nutritional value is less (Saleh *et al.*, 2013). Small millets can potentially play a significant role in promoting immunity, supplying fodder, enhancing biodiversity, and safeguarding farmers livelihoods in addition to addressing food and nutritional well-being. It has enormous therapeutic uses in addition to their nutritional value to treat the diseases like cancer, leprosy, pneumonia, dietary regulation (Singh *et al.*, 2015). Minor millets are a great source of a variety of essential elements that improve health.

Medicinal benefits of millets

Secondary metabolites found in pearl millet include tannins, flavonoids, terpenoids, glycosides, phenol, and steroids. According to its pharmacological qualities, it could treat a variety of medical conditions, including cancer, diarrhoea, and cardiovascular diseases (Ndiku and Ngule, 2015).

Medicinal importance of minor millets

S. No	Name of the Minor Millet	Biological Activity	Reference
1.	Finger millet (<i>Eleusine coracanda</i>)	Diabetes, Cardiovascular disease, Colon cancer, constipation, diverticulosis, wound healing, maintain body temperature during rainy season	Ryan <i>et al.</i> (2011) Pragya and Rita (2012) Mathanghi <i>et al.</i> (2012)
2.	Pearl millet (<i>Pennisetum glaucum</i>)	Neuro – degenerative disorder, Diabetes mellitus, Nephritis, Rheumatism, Alzhiemer disease, Cataracts, Cardiovascular disease, Acute liver toxicity and DNA damage Cancer, cardio vascular disease, reducing tumor incidence, lowering blood pressure	Odusola (2013) Azhari <i>et al.</i> (2014)
3.	Banyard millet (<i>Echinochola frumentacea</i>)	Diabetes mellitus, obesity, hyperlipidemia, Tumor necrosis	Surekha <i>et al.</i> (2013) Goron and Raizada, 2015
4.	Foxtail millet (<i>Setaria italica</i>)	Type-2 diabetes	Thathola <i>et al.</i> (2011)
5.	Kodomillet (<i>Paspalum scrobiculatum</i>)	Severity of asthma, migraine attacks, reduce high blood pressure, diabetic, Heart disease, atherosclerosis and heart attack	Mishra <i>et al.</i> (2014)
6.	Prosomillet	Liver disease	Goron and Raizada,

	(<i>Panicum miliare</i>)		2015
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(Singh *et al.*, 2015)

Conclusion

Millets could grow well in extreme environmental conditions like drought and some wild varieties could still survive in flooded fields and marshy environments. It concluded that millets were shown to have a significant potential to contribute to India food and nutritional security. To overcome the nutrient deficiency like protein, calcium and iron, millet-based foods must be included in the international, national and state-level feeding programmes that will aid in addressing the present nutritional deficiency in developing countries.

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