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Nutritional and health benefits of millets, present status and future prospects: A review

Anjali Eduru, Ankush Kamboj, P Manisha Reddy, Basudev Pal and Vikas

Abstract
Millets are ancient crops being cultivated since ages especially in Asia and Africa which are major millet growing regions to the date. Millets are reservoir of essential amino acids, minerals, vitamins, organic compounds, carbohydrates and are superior to most other staple cereals as far as nutritional value is concerned. They have a strong nutritional profile with a variety of health benefits *i.e.* anticarcinogenic, antimutagenic, antioxidative and antimicrobial properties which can prevent a number of deadly diseases like diabetes, cardiovascular diseases and cancer. Millets are non acid forming, easily digestible and non allergenic. World population is increasing at an alarming rate while a significant portion of global population is already suffering from hunger and malnutrition. Climate change is worsening the situation by endangering the food security. Millets are capable of growing in drought hit, high temperature areas without compromising yield. They fulfils every criteria to be considered as most important crops in maintaining food security as they are least likely to be affected by climate change owing to their inherent genetic potential. There is a tremendous scope in millet production which demand a further exploration in uncapping this huge reserved potential. Thus this article discusses the emerging importance of millets with respect to nutrition, health, food security and processing industry.

Keywords: millet, nutrition, health, climate change, food security

1. Introduction

Millets are small seeded cereals with different varieties such as pearl millet (*Pennisetum glaucum*), finger millet (*Eleusine coracana*), kodo millet (*Paspalum setaceum*), proso millet (*Penicum miliaceum*), foxtail millet (*Setaria italic*), little millet (*Panicum sumatrense*), and barnyard millet (*Echinochloa utilis*). Along with barley (*Hordeum vulgare*), sorghum (*Sorghum bicolor*), oats (*Avena sativa*) and maize (*Zea mays*) they are called coarse cereals. Millets are an important source of nutrition for millions of people, particularly those who are malnourished and people live in hot, dry climates around the world (Kumar *et al*., 2018) They are primarily grown in marginal areas under agricultural conditions in which major cereals fail to produce significant yields (Adekunle, 2012) [2]. Millets belong to Panicoideae sub family of grasses (Yang *et al*., 2012) [85].

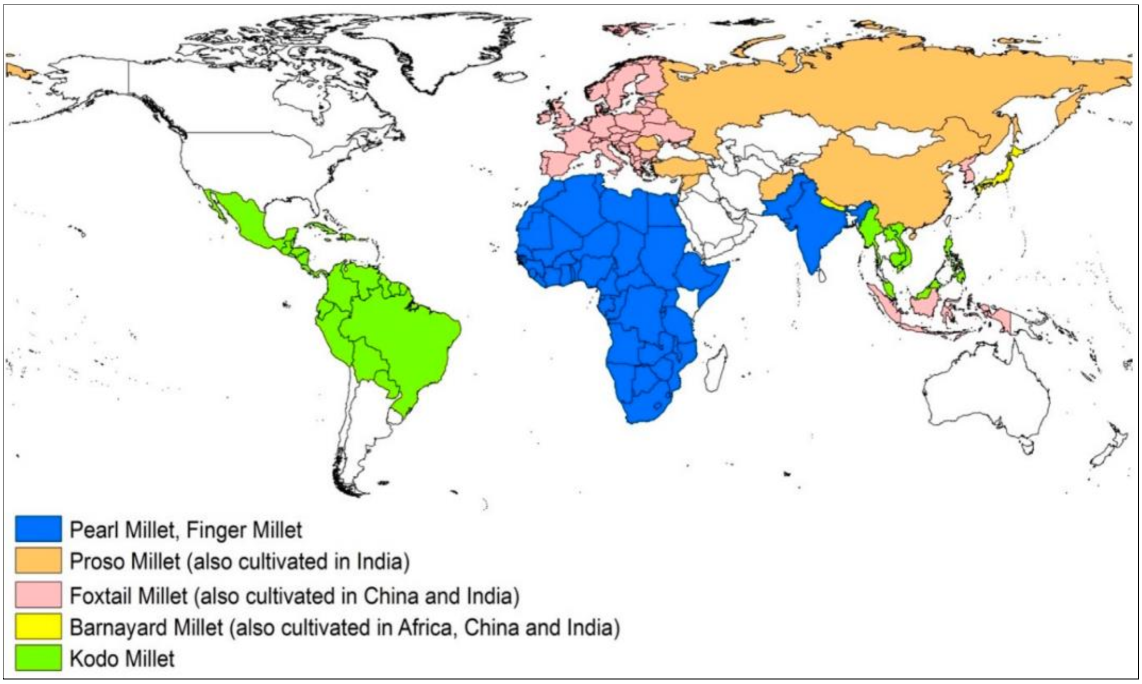
The gracious millets are on their way to becoming a global phenomenon. Recognizing the potential key role of millets in improving the health status of a significant portion of malnourished population globally, the United Nations (U.N.) has decided to declare 2023 as the international year of millets (FAO 2020; Muthamilarasan *and Prasad*, 2020) [55], a resolution sponsored by India and supported by more than 70 countries. The resolution aims to raise public awareness about the health benefits of millets as well as their suitability for cultivation in harsh climate change conditions. And in present situation Food security is a persistent issue, and current staple foods are insufficient to meet challenges such as the current COVID-19 pandemic. Small millets have the potential to become new staple crops, particularly in areas where hunger is a problem. (Muthamilarasan and Prasad., 2020) [55]

2. Millet Production

Globally, finger millet is estimated to be grown on 4-4.5 million hectares, with an output of 4.5 million tons. India and Africa account for 70-80 percent of global finger millet production. (Ganapathy *et al*., 2017) [27] while 98% of the total pearl millet is produced by Africa and Asia. Africa and Asia respectively contributed 43.72% and 52.25% to the global millet production in 2014 (Rao *et al*., 2017) [21]. India produced around 2 million tons of finger millet during 2011-2012 (Chauhan and Sarita, 2018) [16] while Africa emerged the largest producer of sorghum.

Sorghum production in India has decreased from 7 million tonnes in 2010-11 to 4.2 million tones in 2015-16; bajra production has decreased from 10.4 million tonnes to 4.2 million tones. to 8.1 million tones, ragi production fell from 2.2 million tones to 1.8 million tones, and small millets production fell from 0.44 million tones to 0.39 million tones during the same period (Rao *et al*., 2017) [21]. Sorghum (*Sorghum bicolor* L. Moench) is the fifth major cereal of the world after maize, paddy, wheat and barley as per FAO 2014.

East Africa and India are major advocates of finger millet. Foxtail and proso millet are mainly grown in the Middle East and China. South Africa and Ethiopia grow fonio and teff (Rooney *et al*., 1968). Proso millet is the only grain millet of economic value grown in the United States, where it is grown for birdseed. Some yellow endosperm proso millet are decorated and sold in health food stores in the United States (Serna-Saldivar and Espinosa-Ramirez., 2019).



Source: Sustainability 2018, 10, 2228

Fig 1: Geographical distribution of different millets around the globe

Country	Production (tones)	Area Harvested (ha)	Productivity (Kg ha^{-1})
India	10,235830	8449720	12114
Niger	3270453	6831217	4788
China	2300000	900000	25556
Mali	1878527	1989953	9440
Burkina Faso	970176	1176512	8246
Sudan	1133000	3016440	3756
Ethiopia	1125958	455580	24715
Chad	717621	1180431	6079
Senegal	807044	880408	9167

Source: FAOSTAT 2019 [26]

3. Commonly grown millets in India: India has been the largest producer of millets from 2001 to 2009. Mainly eight types of millets are grown in India as major or minor crops in different states. Sorghum is major crop of Maharashtra, Telangana, Central India and Andhra pradesh while pearlmillet is a primary crop in Rajasthan and Gujarat. Finger millet is a major crop in Guarat and Tamil Nadu

3.1 Sorghum (*Sorghum bicolor* L.): Also known as great millet and guinea corn, it is a warm season crop and to a high degree resistant to pests and diseases. Based on colour of endosperm and pericarp, type of endosperm and thickness of pericarp, it is classified in four categories as grain, forage, grass and sudan sorghum (Macrae *et al*., 1993) [50]. Endosperm contains prolamins, glutalins and 80% of the protein present in sorghum grain (Taylor and Schussler, 1986) [77] while albumins and globulins are present in germ. Aleurone layer of grain contains minerals and vitamins. Sorghum also contains considerable quantities of slow digestive starch (SDS) and dietary fibre (9.7 - 14.3 g).

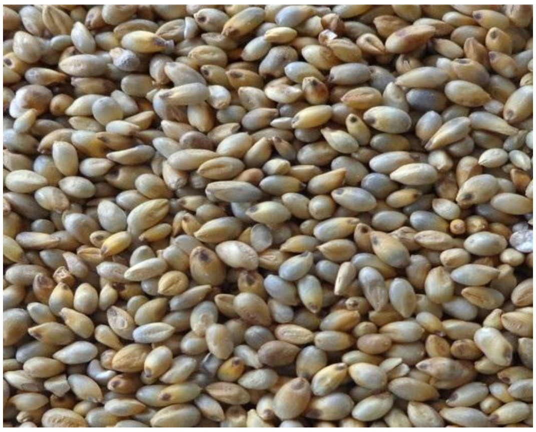
3.2 Pearl millet (*Pennisetum glaucum* L.): The most widely grown millet is pearl millet, which is an important crop in India and parts of Africa (McDonough *et al*., 2000) [52]. In India, there are over 15000 pearl millet lines in the world germplasm array. Generally protein content in pearl millet ranges from 9 to13%. It is very less likely to be affected by climate change owing to its inherent tolerance to drought and high tempreatures and good adaptabiliy in saline and acid soils (Jhuntaki *et al*., 2016) [38]. It responds very favourably to improved management practices under different cropping systems and highest potential yield can be obtained from irrigated hybrid varieties. Pearl millet is often called as poorman's bread and is consumed as unleavened bread (roti or chapatti), gruel, porridge and dessert.

3.3 Foxtail millet (*Setaria italica*): It is also known as Italian millet, has been cultivated since ages and is widely revered for its nutritional value and medicinal properties (Prashant *et al*., 2005) [62]. Traditionally it is being used to treat dyspensia, food stagnancy and as emollient, astringent and stomachic (Yeung, 1985) [86]. It contains 12.3% and 3.3% protein and minerals respectively. It shows strong ability to tolerate abiotic stresses and hence is one of the least affected crop due to climate change (He *et al*., 2015) [35]. Other desirable agronomic aspects include high water use efficiency and yield stability. Once foxtail millet was more valued crop than wheat and rice (Diao, 2011) [23].

3.4 Finger millet (*Eleusine coracana* L. Gaertn): It is called finger milled owing to finger like shape of its panicles. It is an self-fertilized, allotetraploid annual plant (Kerr 2014; Pokharia *et al*. 2014; Goron and Raizada, 2015) [41, 60, 31]. It is fourth most important millet in world (Gupta *et al.,* 2012) [33] and can be cultivated in diverse climatic conditions from sea level to hilly regions (Sood *et al*., 2015) [76]. It fulfills the criteria of being a food security and subsistence crop in hills, drought and famine prone areas (Verma 2009) [80]. Its grain is rarely harmed by storage pests and long shelf life of several years provides it additional advantage to be considered a food security crop (Parashuram *et al.*, 2011; Rurinda *et al*., 2014) [58, 69].

3.5 Proso millet (*Panicum miliaceum* L.): It is an annual grass grown in summer and is also called as"broom corn" due to drooping of its panicles like a broom (Changmei and Dorothy, 2014). It has white or red round grains. Its height ranges from 30 to 100 cm accompanied by an adventitious root system and its life cycle consist of 60 to 100 days (Baltensperger, 2002) [12]. The crop is sensitive to frost and a soil tempreature of 20 to 30 ˚C is required for germination (Amadou *et al*., 2014). It is a C_4 plant with low transpiration rate and high drought tolerance.

3.6 Barnyard millet (*Echinochloa* sp): It is the second most important small millet crop of India (Padulosi *et al*., 2009) [57] and ranks second in terms of production (87000 tons per annum) and productivity (857 kg/ha). It is fast growing and early maturing crop. 35 species of barnyard millet have been identified till now, however only two of them are mainly cultivated *i.e. E. esculenta* (Japanese barnyard millet) and E. *frumentacea* (Indian barnyard millet). In India it is grown in Himalayan hill and Deccan Plateu of Uttrakhand and Tamil Nadu respectively.



Pearl millet (*Pennisetum glaucum* L.)

Finger millet (*Eleucine coracana* L. Gaertn)

Barnyard millet (*Echinochloa sp*)

Sorghum (*Sorghum bicolor* L.)

Fox tail millet (*Setaria italica*)

Proso millet (*Panicum miliaceum* L.)

4. Nutritional quality

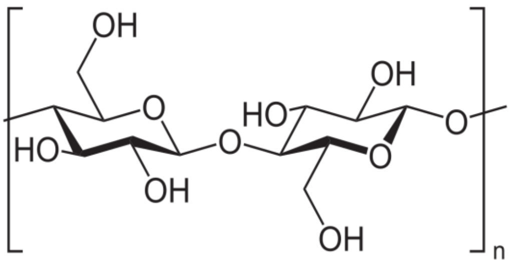
Nutritional quality of food is one of the crucial factor in maintaining human overall physical well-being as nutrition plays key role in health and development along with maximum exploitation of genetic potential of body (Saleh *et al*., 2012). Millets occupy a special place in cereal family as they are a rich and cheap source of calcium, polyphenols, proteins and dietary fibre (Devi *et al*, 2011). The nutritional composition of millets include 60-70% carbohydrates, 1.5-5% fat, 7-11% proteins and 2-7% crude along with bulk of vitamins and minerals. Millet grain contains 50 to 75% starch by weight along with a reservoir of vitamin B, antioxidants and minerals like manganese, magnesium, phosphorus and iron. Additionally millets contain essential fatty acids found in both free form like linoleic, oleic and palmitic acids and in bound form which include monogalactosul, phosphatidyl choline, diacylglycerols, phosphatdyl serine, digalactosyl diacylglycerols and phosphatidylethanolamine (Bagdi *et al.*, 2011) [11].

Millet proteins are good source of essential amino acids especially sulphur containing *i.e.* methionine and cysteine but lack in lysine and threonine (Singh *et al*, 2012) [63, 75]. Millet oil could be a good source of linoleic acid and tocopherols (Amadou *et al*., 2011) [7]. Grains of millets are gluten-free and alkaline in nature (Moreno *et al.*, 2014) [54]. Phosphorus and key vitamins of complex B which plays a vital role in energy production such as riboflavin, niacin, thiamine, folacin are present in ample amount in millets. Pearl millet was discovered to be extremely high in resistant starch, soluble and insoluble dietary fibers, minerals, and antioxidant (Ragaee *et al.*, 2006) [65]. Pearl millet contains relatively high amount of proteins (12-16%) as well as lipids (4-6%). It has a dry matter content of 92.5 percent, an ash content of 2.1 percent, a crude fiber content of 2.8 percent, a crude fat content of 7.8 percent, a crude protein content of 13.6 percent, and a starch content of 63.2 percent (Ali *et al*., 2003) [5]. Proteins contained in finger millet are unique owing to sulphur rich amino acid contents. Finger millet is also the richest source of calcium containing 300-350 mg/100 g. Small millets rivals and are often more superior than fine cereals as far as their nutritional quality is concerned.

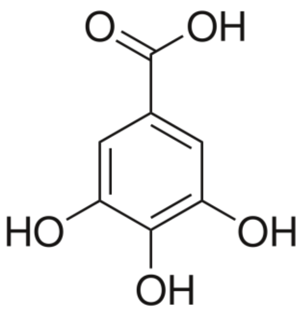
Millets are enriched with micronutrients and contain phytochemicals such as bound phenolics (ferulic acid) , free phenolics (protocatechuic acid), β-glucan, phythates, inulin, lignan resistant starch and sterols (Liu, 2007) [49]. They are also a good source of dietary fiber, tocopherol and carotenoids. Phenolic tannins are main polyphenols present in millets while flavonoids are also present in small quantities.

Nutritional composition of millets and other cereals (per 10 grams edible portion: 12% moisture)

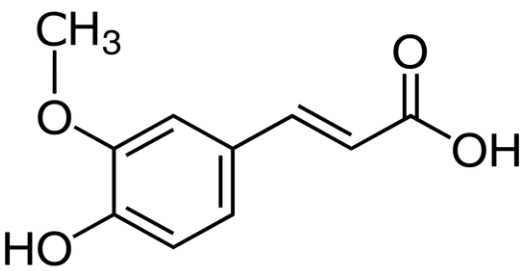
Food	Protein (g)	Fat (g)	Crude ash	Fiber (g)	Carbohydrate (g)	kcal	Ca (mg)	Fe (mg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)
Sorghum	10.4	3.1	2.2	2.0	70.7	329	25	5.4	0.38	0.15	4.3
Pearl millet	11.8	4.8	2.6	2.3	67.0	363	42	11.0	0.38	0.21	2.8
Finger millet	7.7	1.5	3.3	3.6	72.6	336	350	3.9	0.42	0.19	1.1
Foxtail millet	11.2	4.0	3.1	6.7	63.2	351	31	2.8	0.59	0.11	3.2
Common millet	12.5	3.5	5.4	5.2	63.8	364	8	2.9	0.41	0.28	4.5
Little millet	9.7	5.2	4.5	7.6	60.9	329	17	9.3	0.30	0.09	3.2



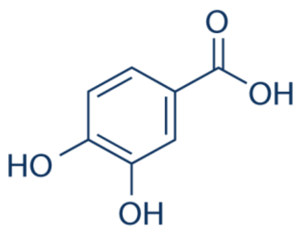
β Glucan



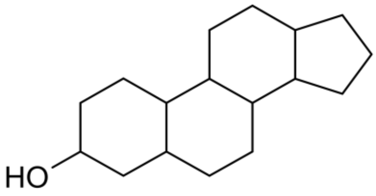
Gallic acid



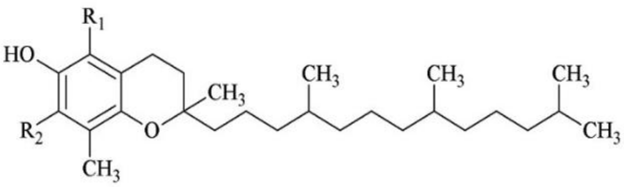
Ferulic acid



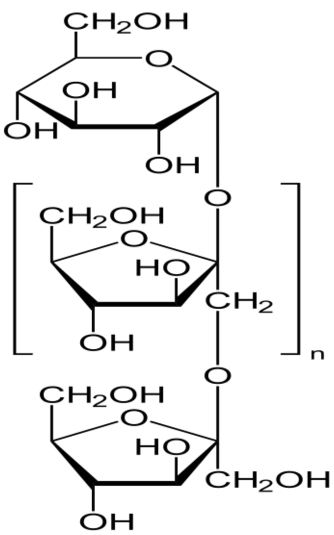
Protocatechuic acid



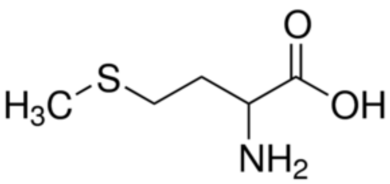
Sterol



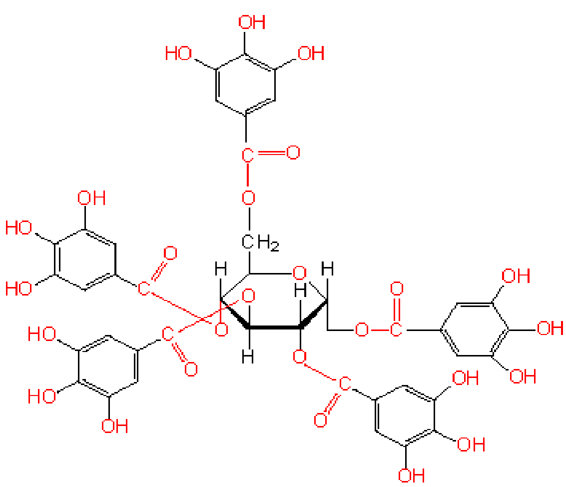
Tocopherol



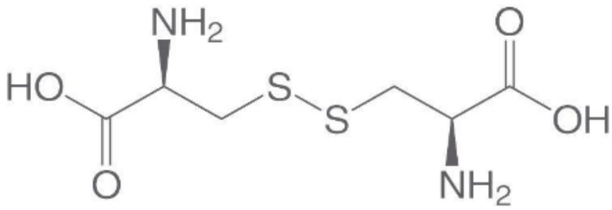
Inulin



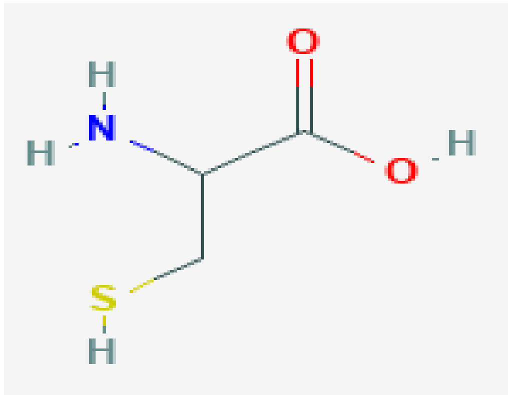
Methionine



Tannins



Cystine



Cysteine

5. Health associated benifits of millets

5.1 Maintainanace of probiotic and prebiotic balance in body: Probiotics maintains the population of beneficial bacteria in the colon in case it is reduced by an disease, chemotherapy or antibiotics. Probiotics are "living microorganisms" which when provided in right amount are healthy for the host (Abd *et al.*, 2012) [1]. Natural probiotic include fermented products of millets which are recommended for treatment of diarrhea in young children (Lei *et al.*, 2006) [47]. In Africa, millet *koko* is prepared in the form of fermented millet porridge and drink (Lei and Jacobson, 2004) and lactic acid-fermented porridge (Amadou *et al.*, 2011) [7].

Prebiotics are non-digestible food ingredients which selectively stimulates the growth and activity of one or a limited number of bacteria in the colon thus benefitting the host. Prebiotic activity is also exhibited by grains of millets which helps to increase the population of friendly bacteria that plays a key role to improve digestion. Malting induces important beneficial biochemical changes in the millet grain.

5.2 Impart resistance to various diseases: Flavonoids present in millets act as antioxidant and play many roles in the body immune system. Regular consumption of millet reduces risk of diabetes. Phenolic compounds present in millets like alpha-glucosidase, pancreatic amylase reduce postprandial hyperglycemia by partially inhibiting the enzymatic hydrolysis of complex carbohydrates (Shobana *et al.*, 2009) [74]. Several inhibitors present in grain like aldose reductase obstructs the the build up of sorbitol which minimize the risk of cataract disease triggered by diabetes (Chetan *et al.*, 2009). Finger millet feeding to diabetic rats maintain blood glucose level and antioxidant status and fasten the skin wound healing (Rajasekaran *et al*, 2004) [66].

Millets are rich in magnesium which reduces the occurence of migraine and heart attack. Millets are good source of phyto-chemicals containing phytic acid which lowers cholesterol level in body (Coulibaly *et al*, 2011) [20]. Finger millet prevents cardiovascular disease by reducing plasma triglycerides in hyperlipidemic rats (Lee *et al*, 2010) [46]. Celiac disease is an immune-mediated enteropathy triggered by the ingestion of gluten making it difficult for genetically susceptible individuals to tolerate even small amount of gluten in diet. Millets being gluten-free present an excellent choice for people suffering from celiac diseases and gluten-sensitive patients often suffering by ingesting the gluten content of wheat and other more common cereal grains (Saleh *et al*, 2013) [70]. Millets also contain phenolic acids, tannins, and phytate that act as "antinutrients". However, these antinutrients lowers the risk for breast and colon cancer in animals. Therefore, millet phenolics may be effective in the prevention of cancer initiation and progression *in vitro* (Chandraseikara and Shahidi, 2011) [15].

Impart resistance to various diseases

S. No.	Disease Prevented	Compound	Function or action	Millet crop
1.	Diabetes	Fibre, Mg, Vitamins, Tannins	Slow release of glucose in blood due to prolonged digestion of fibre (Montonen *et al.*, 2003) [53]	Pearl millet, finger millet, sorghum
2.	Cardiovascular diseases (High cholesterol level)	lignin	Act as antioxidants which reduce plasma triglycerides (Lee *et al.*, 2010) [46]	Finger millet, proso millet, barnyard millet
		Lecithin, Methionine	Remove excess fat from liver and lowers cholesterol level	Finger millet
		Sterol	Reduce absorption and inhibit endogenous synthesis of cholesterol (Carr *et al.*, 2005) [14]	Sorghum
3.	Obesity	High dietary fibre content	Slows digestion and absorption of food by extending its time of passage from stomach to intestine, lowers appetite and consumption (Ali *et al.*,1982; Schneeman and Tietyen, 1994) [6, 72]	Sorghum
		Tryptophan	Reduce appetite	Finger millet
4.	Cancer	Polyphenols and tannins	Acts against human melanoma cells and shows a positive melanomic activity (Gomez-Cordoves *et al.*, 2001) [30]	Sorghum
5.	Celiac Disease	Gluten free grains	grain content cannot modify the level of anti transglutaminase antibodies after prolonged consumption (Carolina *et al.*, 2007) [13]	Sorghum, Pearl millet
6.	Gastrointestinal disorders	Alkaline nature of grains	Maintains stomach pH by neutralizing acidity	Pearl millet
		fiber	Eliminates constipation, excess gas, cramping and bloating	Finger millet
7.	Detoxification	Antioxidants (Quercetin, Cucurmin, Ellagic acid)	Neutralize free radicals and prevent cell disruption, radical cation scavenging (Dykes and Rooney, 2006; Choi *et al.*, 2007) [25]	Kodo millet, little millet, finger millet, foxtail millet, barnyard millet, sorghum

Source: Rao *et al.*, 2017 [21]

6. Solution to malnutrition: World Health Organisation (WHO) defines malnutrition as deficiency, imbalances or excess of energy or nutrient intake in body. A significant percentage of global population in developing countries is suffering from malnutrition especially children, pregnant or lactating women and adolescent girls. Malnutrition is a public health problem in India and prevails at a wide scale, especially poor sections of society are exceptionally more prone to malnutrition compared to other sections owing to negligible access to nutritional food (Narayan *et al.*, 2019) [51]. India, Bangladesh and Pakistan collectively hosts half of the world's malnourished children (World Bank., 2019). Malnutrition alters proper growth and development which is evident from the fact that around 43% of children in India are underweight while every 3 children out of 10 are stunted (IFPRI, 2016) [28, 37]. According to global hunger index report of 2020, India was ranked 94th among 109 countries which highlights the extent of this problem.

Indian government started mid-day meal scheme in schools to provide nutrient rich balanced diet to school going children which has yielded good results (IFPRI, 2016) [28, 37]. Several traditional dishes made of millets like porridge, drinks, millet breads can be added to mid-day meal menu to enhance nutritional status and quality of meals. Ensuring daily intake of vital nutrients in small children through these meals is a sound strategy to provide proper nourishment at young age.

7. Future Prospects

7.1 Food security and climate change: Climate change puts heavy strains on water and soil resources by affecting the availability of first and quality of latter. Soil security refers to maintenance and improvement of the world's soil resources sufficiently to provide food, fiber and freshwater (Koch *et al.*, 2013) [42]. Estimates suggest that 97% of food produced globally is cultivated in soil which also supports 98% of terrestrial biodiversity. Soil quality is being depreciated at an alarming rate which has been given a very little attention so far. This has led to disturbance in food systems, supply demand imbalances, macro and micronutrient deficiencies along with reduction in productivity of staple food crops such as rice, wheat and maize (Saxena *et al*., 2018) [71].

The current scenario have raised relevant concerns to meet the food demand of ever increasing global population which is expected to cross 9 billion mark by 2050 of which 2-3 billion are predicted to suffer from hunger and nutritional insecurities (Godfray *et al*., 2013; Wheeler and Von Braun, 2013) [83]. Elevation in global average temperature global warming due to emission of greenhouse gases directly reduce crop yield and productivity and endangers agriculture sustainability and food security (Kang *et al*., 2009) [39]. Major cereal crops have high global warming potential with wheat accounting for highest (4 tons CO_2 eq/ha) followed by wheat and maize (3.4 tons CO_2 eq/ha).

However, the carbon footprints of other minor cereal crops such as millets and sorghum are comparatively low. This is one of the primary reasons millets can be one of the crops that could reduce carbon footprint in the world (Prasad and Staggenborg, 2009) [61]. Millets can be cultivated in semi-arid and arid regions because of their tolerance to biotic and abiotic stresses and their substantial yield in low quality lands with minimal input (Awika, 2011) [10]. Millets possess thermophilic (ability to grow under higher temperatures) and xerophilic properties (ability to reproduce in water stressed conditions). Pearl millet finger millet, barnyard millet and kodo millet can grow on poor sandy soils and can thrive well in dry climates which receives low annual rainfall (200-500mm) owing their ability to efficiently utilize available moisture compared to sorghum or maize (Guigaz, 2002; Wallace *et al.*, 2015) [32, 82]. It is considered to be an important crop to ensure food security in regions of Africa and India (Passot *et al*., 2016) [59].

Foxtail millet matures early due to its high photosynthetic efficiency which makes it a perfect candidate as a catch crop (Leder, 2004). Due to short life period, several crops can be harvested from same piece of land in a year. Moreover, it is rich in nutrition couples with good resistance to pests and diseases (Dwivwdi *et al*., 2012). This crop has a good yield with only single pre-sowing precipitation (Zhang *et al*., 2007) [87]. All these traits lauds the importance of millets for food security and sustained agriculture.

7.2 Potential for processing industry: Millet crops hold a huge potential for the extension and growth of processing industry both at local and national level. Equipped with majority of prerequisites of a staple food crop, millets are very likely to be recognized as a cheap source of protein and minerals, which are deficient in staple food crops *i.e.* rice and wheat that fulfills mostly energy needs. Millets especially sorghum malt are mainly required in industry as raw material for producing lactic acid and alcoholic fermented beverage and beer (Adekunle, 2012) [2] as well as confectionary and weaning foods (Anukam and Read, 2009) [9].

Millet grains possess excellent processing qualities. Millets are consumed at household levels as a staple crop which demands its processing at both household and industrial levels, which should include entrepreneurs at all three scales i.*e.* small, medium and large (Obilana and Manyasa, 2002; Hamad, 2012) [56, 34]. Primary processing operations consist of wetting, dehulling and milling while secondary operations include fermentation, malting, extrusion, flaking, roasting and popping. The main operations in conventional malting include soaking, germination and drying which is mainly followed in developing countries.

7.3 Value added products: Value added products of millet crops (baked, extruded ready- to- eat meal, etc.) can be marketed and accepted as a good substitute for so called health drinks available in market branded as fortified supplements for children, authenticity of which is regularly questioned by health experts as these contains high amount of sugar and artificial flavouring agents.

Grains of millet crops like kodo (*Paspalum scrobiculatum*) are in high demand for preparing composite flours which is the most important input for designing and producing value-added and functional foods (Kaushik *et al*., 2021) [40]. These composite flours of millets (sorghum, kodo, pearlmillet) and non-millet staple cereals (rice, maize and wheat) are a key ingredient for soft biscuits and cookies, while breads made from millet flours either composite or non-composite are being enquired by scientists for its nutritional value, yielding outstanding results (Akeredolu *et al*., 2005; Laminu *et al.*, 2011; Vidya *et al.*, 2012) [3, 44, 79]. The common millet products in market include flour, meals and grits.

8. Constraints in development of millet industry

A significant portion of nutrients present in grains is lost during processing which diminishes the nutritional quality of end product. Quality is also affected by variations among various cultivars of same species. High cost of imported machinery and expensive equipment coupled with poor storage quality of millet grains amplify the limitations of creating new products. Many local beer brands in underdeveloped and developing countries adds a considerable amount of millets available locally to cut the production cost implied by import of high quality pearl millet due to which quality of end product is compromised (Akeredolu *et al*., 2005; Laminu *et al.*, 2011; Adekunle, 2012) [3, 44, 2]. The current capacity of malt industry is very low.

9. Conclusion

Millets has tremendous potential to emerge as staple food crops in world especially in developing countries owing to their easy availability and diverse distribution coupled with presence of large varietal base. Millets perform relatively better than staple food crops like wheat and rice in adverse climatic conditions in arid and semi-arid regions where water resources are limited as well as soils are problematic (saline, sodic alkaline). Millet crops are a cheap source of quality proteins, macro and micronutrients, minerals, organic compounds which are vital for proper physical and mental growth of body. Equipped with a number of health benefits which include prevention from many common and deadly diseases, millets are a boon to fight against malnutrition, food insecurity and climate change. However, in order to fully exploit the uncapped potential, people must be made aware about the usefulness of millets regarding health and farmers should be encouraged by providing incentives to grow more millets. Health nutritional benefits of millets should be properly advertized and marketed. Governments should make collective efforts to increase millet consumption per capita which can save its expenditure to fight diseases which primarily arise due to malnutrition. Millets can be considered as super food, plethora of vital nutrients and panacea for several diseases.

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