Available online at
www.currentagriculturetrends.vitalbiotech.org

ISSN (E): 2583 – 1933

Curr. Agri.Tren.:e- Newsletter, (2023) *2*(2), 1-4

Current Agriculture Trends: e-Newsletter

Article ID: 181

Millets: Key to Food and Nutritional Security in India

Himanshu Tiwari[1*], R. K. Naresh[1], Mridula Pandey[2]

[1]Department of Agronomy, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India
[2]Department of Food and Nutrition, Acharya Narendra Deva University of Agriculture and Technology, Ayodhya, Uttar Pradesh, India

*Corresponding Author
Himanshu Tiwari*

Article History
Received: 22. 01.2023
Revised: 28. 01.2023
Accepted: 31. 01.2023

INTRODUCTION

Millets: An Approach for Sustainable Agriculture:

Millets are multipurpose: They consume 70 percent less water than rice; grow in half the time of wheat; and require 40 percent less energy in processing. They are one-stop solution in the wake of climate change, water scarcity, and drought conditions along with high nutritive value to provide sustainable food security. Diets with a low environmental impact are protective of bio diversity and ecosystems, which helps ensure access to food and nutrition. Without sacrificing nutritive value, crop diversification through the use of more coarse cereals, like millets, can increase food production, lower greenhouse gas (GHG) emissions, and improve climate resilience. Millets were identified as a viable option for ensuring food security and environmental resilience in a quantitative analysis of changing monsoon cereal production in India. Millets are a smart food because they are good for your health, the environment because they require less water to grow and have a low carbon footprint, and the farmer because they are more tolerant of changing weather patterns. Millets are a source of food for more than 90 million people in Asia and Africa. In the past, millets were poor farmer's insurances against the vagaries of the Indian monsoon. In the future, millets can be our insurance in times of climate change. Millets are resilient to extreme conditions including high temperatures and drought. They can grow in the harshest, most arid regions. Millets have a diverse genetic makeup and require few cultivation inputs. They are also more nutrient-dense than traditional grains. Millets, which are grown for both food and fodder, provide food and livelihood stability to millions of people while also assisting in efficient farming especially for small/marginal farmers of rain-fed areas.

Malnutrition is pervasive in many developing nations; for example, India is one of many countries where child malnutrition is severe. Minor millets are essential food group that has been missing from the food basket in recent years. Minor millets are well-known for their health advantages. Millets are a generally excellent source of fibre, minerals, and B-complex vitamins. Millets' high levels of fibre and the presence of certain antinutritional elements like phytates and tannins have an impact on the bioavailability of minerals (Kumar *et al.,* 2022). "Millets are also rich in health promoting phytochemicals like polyphenols, lignans, phytosterols, phytoestrogens, phytocyanin's. These function as antioxidants, immune modulators, detoxifying agents etc. and hence protect against age-related degenerative diseases like cardiovascular diseases (CVD), diabetes, cancer etc. Some of the known nutrient's vitamins, minerals, essential fatty acids also have benefits in terms of prevention of degenerative diseases besides their known functions of preventing nutritional deficiency diseases. Being non-glutinous, millets are safe for people suffering from gluten allergy and celiac disease. They are non-acid forming, easy to digest and non-allergenic. Millets have potential for protection against age-onset degenerative diseases. Consumption of millets reduces risk of heart disease, protects from diabetes, improves digestive system, lowers the risk of cancer, detoxifies the body, increases immunity in respiratory health, increases energy levels and improves muscular and neural systems and are protective against several degenerative diseases such as metabolic syndrome and Parkinson's disease. The important nutrients present in millets include resistant starch, oligosaccharides, lipids, antioxidants such as phenolic acids, avenanthramides, flavonoids, lignans and phytosterols which are believed to be responsible for many health benefits. Among these, millets are known for their climate-resilient features including adaptation to a wide range of ecological conditions, less irrigational requirements, better growth and productivity in low nutrient input conditions, less reliance on synthetic fertilizers, and minimum vulnerability to environmental stresses. (Tiwari *et al.,* 2022)

Millets: an approach for sustainable agriculture and healthy world

Food Security	**Nutritional Security**
1. Sustainable food source for combating hunger in changing world climate 2. Resistant to climate stress, pests and diseases	1. Rich in micronutrients like calcium, iron, zinc, iodine etc. 2. Rich in bioactive compounds 3. Better amino acid profile

Table 1. Nutrient composition of millets (per 100 g)

Millets	**Carbohydrates (g)**	**Protein (g)**	**Fat (g)**	**Energy (kcal)**	**Crude fibre (g)**	**Mineral matter (g)**	**Ca (mg)**	**P (mg)**	**Fe (mg)**
Finger	72.0	7.3	1.3	328	3.6	2.7	344	283	3.9
Kodo	66.9	8.3	1.4	309	9.0	2.6	27	188	0.5
Proso	70.4	12.5	1.1	341	2.2	1.9	14	206	0.8
Foxtail	60.9	12.3	4.3	331	8.0	3.3	31	290	2.8
Little	67.0	7.7	4.7	341	7.6	1.5	17	220	9.3
Barnyard	65.5	6.2	2.2	307	9.8	4.4	20	280	5.0
Sorghum	72.6	10.4	1.9	349	1.6	1.6	25	222	4.1
Bajra	67.5	11.6	5.0	361	1.2	2.3	42	296	8.0

Table 2. Vitamin profile of millets

Millets	Thiamin(mg)	Niacin (mg)	Riboflavin	Vit B6 (mg/100 g)	Folic acid (mg/100 g)	Vit B5 (mg/100 g)	Vit E (mg/100 g)
Foxtail	0.59	3.2	0.11	–	15.0	0.82	31.0
Proso	0.41	4.5	0.28	–	–	1.2	–
Finger	0.42	1.1	0.19	–	18.3	–	22.0
Little	0.3	3.2	0.09	–	9.0	–	–
Barnyard	0.33	4.2	0.1	–	–	–	–
Kodo	0.15	2.0	0.09	–	23.1	–	–
Sorghum	0.38	4.3	0.15	0.21	20.0	1.25	12.0
Bajra	0.38	2.8	0.21	–	45.5	1.09	19.0

Table 3. Essential amino acid profile of millets (mg/g of N)

Millets	Arginine	Histidine	Lysine	Tryptophan	Phenyl alanine	Tyrosine	Methionine	Cystine	Threonine	Leucine	Isoleucine	Valine
Foxtail	220	130	140	60	420	–	180	100	190	1040	480	430
Proso	290	110	190	50	310	–	160	–	150	760	410	410
Finger	300	130	220	100	310	220	210	140	240	690	400	480
Little	250	120	110	60	330	–	180	90	190	760	370	350
Barnyard	270	120	150	50	430	–	180	110	200	650	360	410
Sorghum	240	160	150	70	300	180	100	90	210	880	270	340
Bajra	300	140	190	110	290	200	150	110	140	750	260	330

Table 4. Micronutrient profile of millets (mg/100 g)

Millets	Mg	Na	K	Cu	Mn	Mb	Zn	Cr	Su	Cl
Foxtail	81	4.6	250	1.40	0.60	0.070	2.4	0.030	171	37
Proso	153	8.2	113	1.60	0.60	–	1.4	0.020	157	19
Finger	137	11.0	408	0.47	5.49	0.102	2.3	0.028	160	44
Little	133	8.1	129	1.00	0.68	0.016	3.7	0.180	149	13
Barnyard	82	–	–	0.60	0.96	–	3	0.090	–	–
Kodo	147	4.6	144	1.60	1.10	–	0.7	0.020	136	11
Sorghum	171	7.3	131	0.46	0.78	0.039	1.6	0.008	54	44
Bajra	137	10.9	307	1.06	1.15	0.069	3.1	0.023	147	39

Table 5. Fatty acid composition and amylose andamylopectin content profile of millets

Millets	Palmitic	Palmeolic	Stearic	Oleic	Linoleic	Linolenic	Amylose (%)	Amylopectin (%)
Foxtail	6.40	–	6.30	13.0	66.50	–	17.5	82.5
Proso	–	10.80	–	53.80	34.90	–	28.2	71.8
Finger	–	–	–	–	–	–	16.0	84.0
Little	–	–	–	–	–	–	-	-
Sorghum	14.0	–	2.10	31.0	49.0	2.70	24.0	76.0
Bajra	20.85	–	–	25.40	46.0	4.10	21.1	78.9

CONCLUSION

Millets have been referred to as 'nutri-cereals' or 'smart foods' due to their better adaption to diverse environmental conditions through efficient use of nitrogen and water, resistance to environmental stresses and tolerance to insect, pests, and diseases. Millets are full of nutrients rich, generally they are richer in beta-carotene, minerals (such as iron, calcium, magnesium, copper, etc.), B-vitamins, antioxidants and other nutrients. Dietary fibre is abundant in millets. With low glycaemic

index and no gluten, the millet diet is excellent for those persons with celiac diseases and diabetes. Small millets have nutritional characteristics indicating that millets could be the staple crops of choice in hunger-stricken areas. Millets have the potential to be a miracle crop. They are suitable for mixed and intercropping with crops like maize and broad bean; grown with millets, provide farmers food nutritional security, sustainable agriculture and livelihood security, beating the adverse effects of climate change. Millets can support to sustainable food systems under climate change. There is an argument to promote them to sustainably address issues like nutrition and food insecurity, increasing drought and heat, environmental degradation sustainably.

REFERENCES

Tiwari, H., Naresh, R. K., Kumar, L., Kataria, S. K., Tewari, S., Saini, A., ... & Asati, R. (2022). Millets for Food and Nutritional Security for Small and Marginal Farmers of North West India in the Context of Climate Change: A Review. *International Journal of Plant & Soil Science*, *34*(23), 1694-1705.

Singh, R. P., Qidwai, S., Singh, O., Reddy, B. R., Saharan, S., Kataria, S. K., ... & Kumar, L. (2022). Millets for food and nutritional security in the context of climate resilient agriculture: A Review. *International Journal of Plant & Soil Science*, 939-953.