



ISSN : 2350-0743

www.ijramr.com



International Journal of Recent Advances in Multidisciplinary Research

Vol. 10, Issue 09, pp.8871-8873, September, 2023

RESEARCH ARTICLE

ROLE OF MILLETS IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS (SDG), ENVIRONMENT & HEALTH ISSUES

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ARTICLE INFO

Article History:

Received 08th June, 2023

Received in revised form

20th July, 2023

Accepted 16th August, 2023

Published online 30th September, 2023

Key Words:

Sustainable Development Goals, Hunger, Poor man's food, Resilient crop, Sorghum.

ABSTRACT

National Food security can be ensured by strengthening the agricultural sector with improved farm practices, increased production yields, and better access to market opportunities as it plays a vital role in economic development, poverty alleviation, and the population's security by supplying nutritional sustenance and improving the livelihoods of vulnerable people in India. In 2015, WHO stressed on 17 Sustainable Development Goals (SDGs), the blueprint to achieve a better and more sustainable future for all, to address global challenges like hunger, poverty, inequality, climate change, environmental degradation, peace, justice, etc. Violent conflict between Russia & Ukraine is another major cause of acute food crises worldwide. As both countries are major wheat exporters, this will aggravate the already precarious food security situation in many developing countries by disrupting wheat production. Maximizing the production of traditional agricultural produce has various limitations. Therefore, this is a challenge to transform the food system into a sustainable strategy which necessitates the propagation of crops like Millets which is climate resilient and less requiring of water, pest control, and chemical fertilizers.

INTRODUCTION

Access to safe and nutritious food has been a fundamental concern of government since ancient times. National Food security can be ensured by strengthening the agricultural sector with improved farm practices, increased production yields, and better access to market opportunities as it plays a vital role in economic development, poverty alleviation, and the population's security by supplying nutritional sustenance and improving the livelihoods of vulnerable people in India. According to the Global Food Security Index 2022, Finland (1st) and Ireland (2nd) hold top positions whereas India (68th rank) has a prevalence of under nutrition of 16.3%. Further, 30.9% of children in India are stunted, 33.4% are underweight, and 3.8% are obese (1, 2). In 2015, WHO stressed on 17 Sustainable Development Goals (SDGs), the blueprint to achieve a better and more sustainable future for all, to address global challenges like hunger, poverty, inequality, climate change, environmental degradation, peace, justice, etc. (4). The number of people affected by hunger globally rose to as many as 828 million in 2021, an increase of about 46 million since 2020 and 150 million since the outbreak of the COVID-19 pandemic, according to a United Nations report that provides fresh evidence that the world is moving further away from its goal of ending hunger, food insecurity and malnutrition in all its forms by 2030 (3).

Violent conflict between Russia & Ukraine is another major cause of acute food crisis worldwide. As both countries are major wheat exporters, this will aggravate the already precarious food security situation in many developing countries by disrupting wheat production and export and by accelerating price hikes in import-dependent developing countries. Analysis shows that a 1% decrease in global wheat trade can increase producer's price of wheat by 1.1%. Wheat export reduction from Russia and Ukraine thus can exacerbate the hunger situation in many developing countries (9). Maximizing the production of traditional agricultural produce appears to be one of the straightway solutions to the problem. However, the overproduction of existing staple foods has various limitations. Therefore, this is a challenge to transform the food system to provide an adaptable, affordable, healthy, and nutritious diet to the needy, irrespective of socioeconomic status. The quest for a sustainable food system necessitates the propagation of crops which should be climate resilient and less requiring of water, pest control, and chemical fertilizers. Apart from staple cereals, the voice to incorporate millets into the human food system is gaining new momentum. The initiative of the government of India to popularize millets production and consumption was globally recognized when the General Assembly of the United Nations declared the year 2023 as the International Year of Millets. While looking at the nutritional and biochemical composition of millet grains reveals that these cereals possess a balanced source of carbohydrates, protein, dietary fibers, lipids, phytochemicals, and essential macro- and

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micronutrients. These magic grains have the potential to play a crucial role in providing affordable quality nutrition, help in fighting against food insecurity, malnutrition and can help in achieving one of the SDG goal (5). It is noteworthy that the seeds of millets like finger millet can be stored for several years without any insect damage, which is one of the risk avoidance strategies in drought-prone areas of Africa (6). Millets are known as the foremost ancient cultivated crops in India. They are of two types: Major & Minor/Small Millets. Major type includes Sorghum (*Sorghum bicolor* L.) and pearl millet (*Pennisetum typhoides* L.) & minor includes finger millet or ragi (*Eleusine coracana* L. Gaertn), barnyard millet (*Echinochloa frumentacea* L.), foxtail of Italian millet (*Setaria italica* L.), kodo millet (*Paspalum scrobiculatum* L.), little millet (*Panicum sumatrense* L.), proso millet (*Panicum miliaceum* L.) and brown-top millet (*Brachiaria ramosa* L. Stapf; *Panicum ramosum* L.) shown in Fig 1.



Figure 1. Different types of Millets (7)

Impression of millets on the environment: Millets can grow in both low and high altitudes and across a wide latitudinal range, on arid lands, under non-irrigated conditions, in very low rainfall regimes, and have a low water footprint. Millets require less water than rice and wheat. They are very tolerant of heat, drought and flood, making the crop an obvious choice for farmers in an era of climate change and depleting natural resources. Millets are an ideal solution for countries to increase self-sufficiency and reduce reliance on imported cereal grains. They need minimal inputs, are resistant to diseases and pests and offer a reduced dependence on synthetic fertilizers and pesticides. They are also more resilient to changes in climate than any other cereals. On top of diversifying the food system, millets can help enhance livelihoods for small farmers, including women, nationally and regionally (8).

Economic effects: Millets are coarse grains that have been traditionally grown and consumed in the Indian subcontinent for about 5,000 years. They are tagged as “poor man’s food grains” because they are grown in underdeveloped areas and are usually eaten by poor people as a staple food. The production of millet can help in increasing the earning of farmers especially in drought-prone areas of Uttar Pradesh, Madhya Pradesh, Uttarakhand, Rajasthan, Gujarat, Karnataka, Maharashtra, Tamil Nadu and Andhra Pradesh. Traditionally, these States have been producing the maximum quantity of millets (98%). The awareness will help to improve the financial health of the farmers particularly of marginal farmers living in under developed dry and arid areas.

This initiative will be a game changer in the future not only in health, but food and agriculture sectors also. Once tagged as the poor man’s food, millets are increasingly finding their way into dinner plates across the world (10).

Nutritional & health aspects: Various types of millet are cultivated in different states of India (Fig 2).



Figure 2. Millet Map of India (12)

Millets are known to be highly nutritious as they contain high protein, essential fatty acids, dietary fiber, B-Vitamins, minerals such as calcium, iron, zinc, potassium and magnesium which have anti-oxidant and anti-microbial properties. The **health benefits** of millet-based foods are as follows:

- Sorghum millet is gluten-free, so it can be helpful for persons suffering from celiac disease.
- Sorghum millet is rich in dietary fibre and has a low glycemic index, which could help in the prevention and control of Type 2 diabetes. The fibre, magnesium, vitamin E, phenolic compounds and tannins present in foods reduce the risk of diabetes as they slow the sudden increase of blood glucose and insulin level.
- Sorghum millet contains tannins and polyphenols that have anti-mutagenic and anti-carcinogenic effects (11).
- Millets also helps in preventing the risk of heart attacks and strokes due to low cholesterol level.
- Anti-nutrients present in millet reduces the risk of cancer initiation and progression in vitro.
- Millet grains are rich in antioxidants and phenolics; however, it has been established that phytates, phenols, and tannins can contribute to antioxidant activity important in health, aging, and metabolic syndrome. It has also been found that methanolic extracts from finger millet and kodo millet inhibited glycation and cross-linking of collagen. Therefore, there is the potential usefulness of millets in the protection against aging.
- Millet grain fractions and extracts were found to have antimicrobial activity. The seed coat of finger millet extract

showed higher antimicrobial activity against *Bacillus cereus* and *Aspergillus flavus*. Therefore, the results indicated that potential exists to utilize finger millet seed coat as an alternative natural antioxidant and food preservative (13).

These properties of millets cannot only maintain physical health but also benefits the environment. The awareness regarding the production & usage of millets can help to provide benefits to farmers, public, businesses, etc.

CONCLUSION

The quest for a sustainable food system necessitates the propagation of crops which should be climate resilient and less requiring of water, pest control, and chemical fertilizers. Apart from staple cereals, the voice to incorporate millets into the human food system is gaining new momentum. The initiative of the government of India to popularize millets production and consumption was globally recognized when the General Assembly of the United Nations declared the year 2023 as the International Year of Millets.

While looking at the nutritional and biochemical composition of millet grains reveals that these cereals possess a balanced source of carbohydrates, protein, dietary fibers, lipids, phytochemicals, and essential macro- and micronutrients. These magic grains have the potential to play a crucial role in providing affordable quality nutrition, help in fighting against food insecurity, malnutrition and can help in achieving one of the SDG goal.

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