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Role of Traditional Food Grains Shri Anna (Millets) in the Context of the UN-Sustainable Development Goals (SDG): A Review

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Abstract

Millets have potential therapeutic and nutrition profiles that play an important role in achieving Sustainable Development Goals (SDG). The Sustainable Development Goal SDG3 is one of the most important goals, which is crosstalk other SDGs. The objective of SDG3 is to promote health and wellbeing. Millets are helpful in many pathological conditions because of their gluten-free property and low glycaemic index that promotes SDG-3 Good Health and Well-being. Millets are high in protein, vitamins, minerals, and fiber, all of which are deficient in the diets of impoverished people. They can also give you long-lasting satisfaction and are a good energy source. So, millets play an important role in achieving SDG 2 Zero Hunger. Millets require less investment and natural resources as compared to major cereals. Millets can achieve SDG 1 (No poverty) by providing a stable source of income for small farmers. A smaller amount of fertilizer and insecticide is needed for the millet crop, which is helpful for preventing harmful effects on the environment that helps meet SDG 13 Climate Action. This article analyses the role of millets in achieving Sustainable Development Goals, primarily environmental and health issues, particularly SDG1, SDG 2, SDG 3, and SGD 13.

***Key words*:** Millets, Sustainable development goals, Ayurveda, Nutri-cereals, Food

The United Nations (UN) General Assembly adopted 17 Sustainable Development Goals (SDGs) in September 2015 as an integral part of the 2030 agenda for sustainable development [1-2]. 17SDGs apply to all countries and contain coverage and balance between social, economic, and environmental and their institutional or governance aspects [3]. The SDGs include 17 goals, 169 targets, and more than 300 indicators [4].

Millets

The United Nations General Assembly (UNGA) has declared the year 2023 as the International Year of Millets. This divulges the importance of millets in health and their role in food security [5]. Millets are groups of grasses belonging to the family Poaceae, widely grown for food and feeding in many parts of the country. As compared to major cereals, most of the millets have small seeds. various types of millets grown at large scale in different part globe like *Eleusine coracana* Linn. (finger millet) *Pennisetum typhoides* Burm. f. Stapf. & Habbard (pearl millet), *Setaria italica* Linn. Beauv (foxtail millet), *Panicum miliaceum (*proso millet), *Paspalum scrobiculatum* Linn. (kodo millet), *Panicum miliaecum* Linn (little millet), and (*Echinochloa frumentace* Linn (barnyard millet) [6-7]. Millets are small seeded cereals traditionally cultivated by farmers with less /poor resources of Asian and African Continents. Low-income group people consume millet. Millets have been cultivated since ancient times; for example, finger millet was 5000 years ago, pearl millet 4000 years ago, and foxtail millet 8000 years ago [8-11]. Millets are rich in nutrients, fiber, vitamins, and minerals and are used as food and medicine for maintaining health and various pathological conditions of the body. The main aim of the United Nations International Year of Millets 2023 to create awareness about the nutritional, health benefits, and climate adaptability of the millets globally [5].

Millets in SDGS

Awareness and promotion of millet cultivation and its health benefits help achieve the UN's SDGs. Healthy lives and promoting well-being for all is the major aim of SDG 3. Modern food systems lack essential nutrients. Millets contain vital nutrients, fiber, vitamins, and minerals, helping to prevent many chronic diseases like diabetes, heart disease, cancer, obesity, constipation, and cholesterol levels [12]. Millets are very helpful for managing or preventing various lifestyle-related disorders. Many healthcare providers recommend a millet-based diet in daily life; as a result, there is a huge demand for millet production globally. Because millets are so rich in micronutrients, they provide good health for individuals and foster community well-being. Millet-based diet consumption could also help to meet good health and well-being SDG 3. The main aim of SDG-2 is to End hunger, achieve food security and improved nutrition, and promote sustainable agriculture. It is internally related to society, the economy, and the environment; In agriculture, most major crops require fertilizer and pesticides in the current scenario. Millets are grown in arid and semi-arid conditions, and drought tolerant, and grow in areas with less water /rain. Seeds of the millets do not require any pesticide for storage; for example, seeds of finger millets can be stored for many years without pesticides. As compared to major crops,

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millets did not receive attention during the Green Revolution. Millets are used as food and fodder in many parts of the world. Millets are grown very quickly in areas where rainwater is low, and the climate is hot. They require less resources as compared to major cereals. Suitability for cultivation even in adverse climatic conditions, millets promote sustainable agriculture without or less fertilizer and pesticide. Increasing use of fertilizer and pesticides in agriculture can cause ecological and environmental damage. On the other hand, millet cultivation and consumption are anticipated to promote sustainable agriculture without harmful effects on the environment [12-15]. Due to climate resilience in the face of adversity, millets can also help to meet SDG 13 Climate Action. The main aim of SDG 13 (climate action) is to promote mechanisms for raising capacity for effective climate change-related planning and management in the least developed countries and small island developing States [2]. Due to the harmful effects of global warming and climate change, millets may help improve food production. Millet does not require large amounts of fertilizer and pesticides compared to major cereals. This is meant to reduce the demand for fertilizer and help the environment. Millets require less investment as compared to the investment needed for major crops. The cost of cultivation for millet crops is very low compared to rice and wheat. Millets require fewer resources for cultivation. This may be helpful in generating income for farmers in rural areas, thus meeting SDG 1.

Therapeutic activity of millets in Ayurveda

In Ayurveda, millet is used as medicine for various pathological conditions and as a food for nutritional purposes. In Ayurvedic classical texts, many millet-based food preparations are mentioned as food and medicine. In Ayurveda Samhita millets are classified under three categories like *Trina dhanya* (grass-derived grains), *Kshudra dhanya* (small-sized grains) and *Kudhanya* (Inferior among grains). These are Gavedhuk (*Coix lacryma* jobi Linn), Kanguni (*Setaria italica* Linn. Beauv.), Sama (*Echinochloa frumentace* Linn.), Kodo (*Paspalum scrobiculatum* Linn.), Ragi (*Eleusine coracana* Linn.), Bajra (*Pennisetum typhoides* Burm.f.Stapf. & Habbard), Neewar (*Hygroryza aristata* Retz.), Cheena (*Panicum miliaecum* Linn.), Jowar (*Sorghum vulgare* Pers). On the basis of Ayurveda literature, *Rasa* (taste) of millets have *Kashaya - Madhura* (astringent and sweet) predominant, *Guna* (attribute) *Laghu -Ruksha* (light-dry) in nature, *Sheet virya* (coldpotency) and *Katu vipaka* (pungent bio-transformed *Rasa*) and *Lekhana* (scarifying) and *Kledashoshana* (dries up excessive moisture) in Karma (action) [16-21].

In Ayurveda, millets are valued for their nutritional benefits and therapeutic properties. They are traditionally used to address various pathological conditions and maintain overall health. Ayurveda classifies millets into three categories: Trina Dhanya (grass-derived grains), Kshudra Dhanya (small-sized grains), and Kudhanya (inferior grains). Each type of millet has specific therapeutic actions based on its unique properties:

Sama (Barnyard millet)

Therapeutic actions: Used for treating obesity, bleeding disorders (Raktapitta), cough due to Pitta dosha (Pittaj kasa), thigh stiffness (Urustambha), abnormalities in breast milk (Stanyadosa), and ascites (Jalodara).

Kodrav (Kodo millet)

Therapeutic actions: Effective against obesity, bleeding disorders, cough due to Pitta dosha, poison (Visha), thigh stiffness, excessive thirst (Trishna), abnormalities in breast milk, ascites, and skin disorders (Kustha).

Gavedhuk (Job's tear)

Therapeutic actions: Treats obesity and vomiting due to Kapha dosha (Kapaj Chardi).

Kanguni (Foxtail millet)

Therapeutic actions: Addresses skin disorders, pacifies burning sensation due to Pitta dosha (Pittadaha nashak), and aids in healing fractures and dislocations (Bhagnaasthi Sandhan).

Cheena (Common millet)

Therapeutic actions: Known for its nourishing properties (Brihana).

Jawar (Great millet)

Therapeutic actions: Enhances nourishment (Brihana), improves taste perception (Ruchikarak), and boosts sperm production (Viryavardhak).

Ragi (Finger millet)

Therapeutic actions: Strengthens the body (Balakarak) and enhances nourishment.

Bajra (Pearl millet)

Therapeutic actions: Acts as a strength enhancer (Balya) and stimulates digestive fire (Agnideepak).

Properties of millets in Ayurveda

- Rasa (Taste): Predominantly astringent (Kashaya) and sweet (Madhura)
- Guna (Attributes**)**: Light (Laghu) and dry (Ruksha)
- Virya (Potency): Cold (Sheet)
- Vipaka (Post-digestive Effect): Pungent (Katu)
- Karma (Action): Scarifying (Lekhana) and drying up excessive moisture (Kledashoshana)

Table 1 Therapeutic action of millets [18]

Millet	Therapeutic action
Sama (Barnyard millet)	Obesity, *Raktapitta* (bleeding disorder), *Pittaj kasa*(cough due to Pitta dosa), *Urustambha*,(stiffness of thighs), *Stanyadosa* (abnormalities in breast milk),*Jalodara* (Ascites)
Kodrav (Kodo millet)	Obesity, *Raktapitta* (bleeding disorder), *Pittaj kasa* (cough due to Pitta dosa), *Visha* (Poision), *Urustambha* (stiffness of thighs), *Trishna* (thirst), *Stanyadosa* (abnormalities in breast milk), *Jalodara* (Ascites) *Kustha* (skin disorder)
Gavedhuk (Job's tear)	Obesity, *Kapaj Chardi* (vomiting due to Kaphaj dosa)
Kanguni (foxtail millet)	*Kustha* (Skin disorder) *Pittadaha nashak* (pacifying burning sensation due to Pitta dosha), *Bhagnaasthi Sandhan* (heal fractures and dislocations)
Cheena (Common millet)	*Brihana* (nourishing)
Jwar (Great millet)	*Brihana* (nourishing), *Ruchikarak*, (improves perception of taste), *Viryavardhak* (sperm enhancer)
Ragi (Finger millet)	*Brihana* (nourishing), *Balakarak*(strength enhancer)
Bajra (Pearl millet)	*Balya* (strength enhancer), *Agnideepak* (Digestive fire stimulator)

These properties contribute to millets' effectiveness in treating various conditions. For example, their light and dry nature helps manage obesity and excessive moisture-related disorders. The cold potency makes them suitable for pacifying heat-related conditions, while their nourishing qualities support overall health and vitality. The Therapeutic action of millets given in (Table 1).

Millets, with their diverse therapeutic properties, play a significant role in Ayurvedic medicine, offering natural solutions for a wide range of health conditions.

Millets are climate-smart crops and play a remarkable role in attaining the sustainable development goal of the UN. Overall, millets are a highly nutrient-rich grain, climate-resilient, and ecologically sound food source that can be crucial to accomplishing sustainable development objectives. Millets are inexpensive, nutrient-dense foods that can help eradicate poverty. Millets are a good source of vitamins and minerals necessary for optimum health and well-being and the prevention of chronic diseases. International Year of Millets will contribute to achieving UN Sustainable Development Goals, particularly SDG 1, SDG 2 (Zero Hunger), SDG 3 (Good health and well-being) and SDG 13 (Climate action).

The role of millets in sustainable development

Millets are considered climate-smart crops and play a significant role in achieving the United Nations' Sustainable Development Goals (SDGs). These goals aim to address global challenges such as poverty, hunger, health, and climate change by 2030. Millets, with their unique characteristics, contribute remarkably to these objectives in several ways:

Climate-resilience and ecological sustainability

Climate-resilient crops: Millets are well-suited to grow in arid and semi-arid regions, enduring harsh climatic conditions with minimal water and nutrient requirements. This resilience makes them ideal for areas prone to drought and other climate-related stresses.

Low resource requirement: They require fewer inputs like water, fertilizers, and pesticides compared to other major cereals. This not only makes their cultivation more sustainable but also reduces the environmental footprint of agriculture.

Nutrient-dense and health-promoting

Rich in nutrients: Millets are packed with essential vitamins, minerals, and dietary fiber. They are an excellent source of micronutrients such as iron, magnesium, phosphorus, and B-vitamins, which are crucial for maintaining good health and preventing chronic diseases.

Health benefits: Regular consumption of millets can help prevent and manage various health conditions, including diabetes, heart disease, obesity, and certain cancers. Their high fiber content supports digestive health and helps maintain healthy cholesterol levels.

Economic benefits and poverty eradication

Inexpensive and accessible: Millets are relatively inexpensive to grow and purchase, making them an accessible food source for low-income populations. Their cultivation can generate income for smallholder farmers, contributing to poverty reduction and economic stability in rural areas.

Employment opportunities: The promotion of millet cultivation and processing can create job opportunities in agriculture and related industries, fostering economic growth in rural communities.

Contributions to sustainable development goals

SDG 1 (No poverty): By providing a stable and affordable food source, millets help improve food security and income for farmers, thereby contributing to poverty eradication.

SDG 2 (Zero hunger): Millets' high nutritional value and adaptability to challenging growing conditions support food security and improved nutrition, especially in vulnerable regions.

SDG 3 (Good health and well-being): The health benefits of millets align with the goal of ensuring healthy lives and promoting well-being for all. Their nutrient density helps combat malnutrition and lifestyle-related diseases.

SDG 13 (Climate action): Millets' ability to thrive in adverse climatic conditions and their low resource requirements make them an excellent choice for sustainable agriculture. Their cultivation helps mitigate the impact of climate change and promotes resilience in agricultural systems.

International year of millets 2023

The declaration of 2023 as the International Year of Millets by the United Nations General Assembly aims to raise awareness about the benefits of millets and promote their global cultivation and consumption. This initiative is expected to:

- Highlight the role of millets in sustainable agriculture and food security.
- Encourage research and development to improve millet yields and resilience.
- Foster international collaboration to share best practices and technologies for millet cultivation.
- Increase consumer awareness and demand for millet-based products, thereby supporting farmers and local economies.

Millets are more than just a nutritious food source; they are pivotal in achieving several key sustainable development goals. Their climate resilience, ecological sustainability, and economic benefits make them an invaluable crop for addressing some of the world's most pressing challenges. By promoting the cultivation and consumption of millets, the International Year of Millets 2023 seeks to harness their full potential in creating a healthier, more sustainable, and equitable world [22].

CONCLUSION

The declaration of 2023 as the International Year of Millets by the United Nations General Assembly underscores the critical role of millets in global food security and health. These nutrient-dense grains, cultivated with minimal resources, offer substantial health benefits, including the prevention of chronic diseases and the promotion of overall well-being. The promotion of millet cultivation aligns with several UN Sustainable Development Goals, notably SDG 1 (No Poverty), SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), and SDG 13 (Climate Action). Millets' resilience to adverse climatic conditions and low input requirements make them an environmentally sustainable choice, supporting sustainable agriculture and reducing ecological impact. Furthermore, millets have a rich history in traditional medicine, particularly Ayurveda, where they are utilized for their therapeutic properties. As the world increasingly recognizes the value of millets, their cultivation and consumption can contribute significantly to sustainable development, improved health outcomes, and environmental conservation.

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LITERATURE CITED

1. Biermann F, Kanie N, Kim RE. 2017. Global governance by goal-setting: the novel approach of the UN Sustainable Development Goals. *Current Opinion in Environmental Sustainability* 26: 26-31.
2. United Nations General Assembly: Transforming Our World: The 2030 Agenda for Sustainable Development. Draft resolution referred to the United Nations summit for the adoption of the post 2015 development agenda by the General Assembly at its sixty ninth session. UN Doc. A/70/L.1 of 18 September 2015
3. Costanza R, Daly L, Fioramonti L, Giovannini E, Kubiszewski I, Mortensen LF. 2016. Modelling and measuring sustainable wellbeing in connection with the UN sustainable development goals. *Ecological Economics* 130: 350-355.
4. Kumar S, Kumar N, Vivekadhish S. 2016. Millennium development goals (MDGS) to sustainable development goals (SDGS): Addressing unfinished agenda and strengthening sustainable development and partnership. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive and Social Medicine* 41(1): 1.
5. Antony Ceasar S, Maharajan T. 2022. The role of millets in attaining United Nation's sustainable developmental goals. *Plants, People, Planet* 4(4): 345-349.
6. Riley KW, Gupta SC, Seetharam A, Mushonga JN. 1993. *Advances in Small Millets*. Oxford & IBH Pub. Co: New Delhi, India. pp 557.
7. Padulosi S, Mal B, King OI, Gotor E. 2015. Minor millets as a central element for sustainably enhanced incomes, empowerment, and nutrition in rural India. *Sustainability* 7(7): 8904-8933.
8. Vetriventhan M, Azevedo VCR, Upadhyaya HD, Nirmalakumari A, Kane-Potaka J, Anitha S. 2016. Genetic and genomic resources, and breeding for accelerating improvement of small millets: Current status and future interventions. *Nucleus* 1: 217-239. https://doi.org/10.1007/s13237-020-00322-3
9. Chamoli V, Badoni A, Bahuguna N, Joshi N. 2018. Finger millet (*Eluesine coracana*):—Nutritional status, health benefits and processing status—A review. *Journal of Pharmacognosy and Phytochemistry* 80(5): 1-4.
10. Lu TLD. 2014. A green foxtail (*Setaria viridis*) cultivation experiment in the middle Yellow River Valley and some related issues. *Asian Perspective* 41: 1-14. https://doi.org/10.1353/asi.2002.0007
11. Taylor JRN. 2018. Sorghum and millets: Taxonomy, history, distribution, and production. *In*: *Sorghum and Millets: Chemistry, Technology, and Nutritional Attributes* (2nd Edition). Woodhead Publishing and AACC International Press. 2019: 1-21.
12. Devkota R, Khadka K, Gartaula H, Shrestha A, Karki S, Patel K, Chaudhary P. 2016. Gender and labour efficiency in finger millet production in Nepal. *In*: *Transforming Gender and Food Security in the Global South*. Routledge. ISBN: 9781138680418.
13. Goron TL, Raizada MN. 2015. Genetic diversity and genomic resources available for the small millet crops to accelerate a new green revolution. *Frontiers in Plant Science* 6: 157.
14. Ceasar SA, Ignacimuthu S. 2016. Genetic engineering of millets: Current status and future prospects. *Biotechnology Letters* 31(6): 779-788. https://doi.org/10.1007/s10529-009-9933-4
15. Thilakarathna MS, Raizada MN. 2015. A review of nutrient management studies involving finger millet in the semi-arid tropics of Asia and Africa. *Agronomy* 5: 262-290. https://doi.org/10.3390/agronomy5030262
16. Shastri AD. 2011. Sushruta Samhita of Sharira, Ayurveda Tatava Sandipika Commentary, Chaukhamba Sanskrit Sansthan, Varanasi, India, 1(9): 248.
17. Gupta KA. 2011. Ashtang Hridaya of Vagbhat, Vidyotini Hindi Commentary, Chaukhambha Prakashan Varanasi Sutra Sthana.
18. Morya GC, Vinita V, Mishra HS, Shakya S, Bahadur R, Yadav KN. 2017. Millets: The indigenous food grains. *International Journal of Advanced AYUSH* 6(1): 447-452.
19. Londhe D, Gundeti MS. 2023. Perspective on- 'Millet for Health initiatives by Ayush Institutes across India based on the Hon'ble Prime Minister's Millet-promotion call through Mann ki Baat. *Journal of Research in Ayurvedic Sciences* 7(5): 41.
20. Pandey KN, Chaturvedi GN. 2009. Charak Samhita of Agnivesh, Vidyotani Hindi Commentary, Chaukhamba Bharati Academy, Varanasi, India
21. Nesari TM. 2023. Celebrating International Year of Millets: Way towards Holistic Well-Being. *Journal of Ayurveda Case Reports* 6(1): 1-4.
22. Kumar AC. 2023. Pharmacological activity of millet. *European Chemical Bulletin* 12(10): 11306-11313.