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The status of millets in Odisha: A review

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Abstract
Millets are one of the most valuable and nutritive ingredient among all agricultural crops. The production of different types of millets holds a major advantage in sustaining the agricultural food demand in the country. This review highlights the importance of millets in terms of production, the growing phenomenon of millets and the production data in India. The use of millets has shown an elevated graph with its nutritive value being accelerated among the health enthusiastic generation today. The production data resembles its growing demand with additive and varietal food demands. India needs the cultivation of millets to fulfill the food demands approaching with cultivated land area gradually diminishing.

Keywords: Millets, agricultural crops, enthusiastic generation

Introduction
Millets hold a significant place in Indian food. The history of Indian food will be incomplete without giving due importance to millets. Millets are grown widely in India, Nigeria, Asian and African countries. It appears as seed and possesses high nutritional value equal to sorghum and other cereals. Millets belong to Poaceae (grass) family and considered as an ancient grain. Apart from human consumption, it is also extensively used to feed livestock and birds. There are varieties of millets which differ in color and appearance, but they all belong to grass family. Being rich in protein, fiber and antioxidants, millets are gluten-free. There are multiple advantages of millets for which the crop is widely favored. It is grown in harsh environments in less fertile soil, and highly resistant to drug and pests. Humans have been consuming millets for about 7000 years. Due to its varieties of health benefits, with the passage of time, millets have gained recognition as a multi-crop agriculture. Millets belongs to Plantae kingdom. The length of millet grain is 3-4 mm long. Its seed generally weigh between 2.5 - 14 grams. The major millet grown in India are Sorghum and Pearl millets, while minor millets are Finger, Proso, Little, Foxtail, Barnyard and Kodo.

Ancient history of Millets
In India, the essence of millets can be traced from Yajurveda texts. In the Bronze Age (4500 BC), millets were commonly consumed. As mentioned in some of the Yajurveda texts, Foxtail, Barnyard and Black Finger are identified as Priyangava, Aanava and Shyaamaka millets respectively. Around 50 years ago millets was largely grown in India. It was one of the staple foods in village areas. Gradually, with due course of time, millets was included in fooding practices among the urban mass. There are two major categories in which millets are divided are

1. Major Millets
2. Minor Millets
Major millets include
a) Sorghum (Jowar)
b) Pearl (Bajra)

Minor millets include
a) Finger (Ragi)
b) Foxtail (Kakum)
c) Kodo (Kondon)
d) Barnyard (Sanwa)
e) Little (Kutki/Shavan)
f) Proso (Chenna/Barri)

Nutrient composition of major and minor millets

Major millets

a) **Sorghum (Jowar) -** It is rich in protein, fiber, folic acid which is essential for overall development of the body. Besides, it also contains potassium, phosphorus and calcium which enhances body metabolism.
b) **Pearl (Bajra) -** Pearl millets contains high dietary fiber. It is also a rich source of magnesium, iron, copper, vitamins E & B complex. Moreover, pearl millets cab minimizes risk of inflammatory bowel diseases. Besides, it is also possess high calcium & unsaturated fats which plays a vital role keeping the body balanced.

Minor millets

a) **Finger (Ragi) -** Finger millets possess unique quality due to its high mineral, sulphur & amino acids content. It has low protein, fat and high antioxidants. Finger millets are largely used as weaning foods.
b) **Foxtail (Kakum) -** Foxtail millets are well known for digestible and non-allergic grains. Being rich in protein, it gives a sweet nutty flavor and used to prepare varieties of dishes.
c) **Kodo (Kondon) -** Kodo millets are considered best to strengthen the nervous system. It has very high fiber, high protein and low fat. It is also rich in calcium, magnesium, potassium and zinc.
d) **Barnyard (Sanwa) -** Barnyard millets are used as antioxidants to lower blood lipid levels. It contains rich source of crude fiber and iron.
e) **Little (Kutki/Shavan) -** It is rich in dietary fiber and possess antioxidants properties. It is smaller in size compared to other millets. It also possesses high iron proportion.
f) **Proso (Chenna/Barri) -** Proso millet holds ample of health benefits. They are richest source of protein, carbohydrates and fats. It minimizes the cholesterol level and reduces heart disease.

Growth stages

The seedling establishment with root, leaf, and tiller development takes place during this phase. Panicle initiation also begins. Elongation of all the leaves, emergence of all tillers, floral initiation in tillers, and stem elongation takes place during this phase. The elongation of the panicle and formation of floral parts are found in this phase. This stage comes to end with the emergence of stigmas on the panicle. This phase begins with fertilization of florets and continues up to maturity of the plant. The dry matter accumulation is mainly in grain formation and partly in the enlargement of stem and leaves of the tillers. The end of this phase is physiological maturity, indicated by the development of dark layer at the bottom of the grain.

Table 1: Growth stages

Growth (DAS)	Phenotypic character	Short Duration (Approx Days After Emergency)	Long Duration
0	Coleoptile visible	0	0
1	3rd Leaf Stage	6	6
2	5th Leaf Stage	14	15
3	Panicle Initiation	22	28
4	Flag Leaf Visible	33	43
5	Boot Stage	36	47
6	50% Stigma Emergence	40	53
7	Milk Stage	49	61
8	Dough Stage	58	69
9	Physiological Maturity	65	75

Importance of Millets in Odisha

Odisha is a tribal dominated state. It has third largest tribal population of India. There are 62 tribal communities with 13 vulnerable tribal groups residing in the state. Almost 70 percent of the entire populations are dependent on agriculture in Odisha. In such a scenario, millets production holds a significant importance in Odisha. Though it has been considered as a staple food among the villagers since ages, it is cultivated extensively in rural areas. Moreover, in the tribal dominated districts of Koraput, Malkangiri, Rayagada, Nabarangpur, Kandhamal, millets production is more. The cost and effort required for millets production is also minimal, due to which it is cultivated extensively. It can be grown in extreme weather condition with less fertile soil. Millets are climate resilient crops; hence it is favored by farmers. Due to lack of education and accessibility to modern farming techniques, millets production is practiced mostly the tribal communities. They cultivate millets to earn their livelihood. It is also considered as their primary food, they consume it in daily basis. Among the underprivileged and marginalized people, millet has been proved as a primary source to earn their bread and butter. Moreover, is has been found that millets are rich source of protein, iron and calcium which can combat against malnutrition.

Odisha Millets Mission (OMM)

In 2017 Odisha Millets Mission (OMM) was launched in 11 tribal dominated districts. It is a flagship programme of Department of Agriculture and Farmers Empowerment; Government of Odisha. With an aim to promote millets, pulses & oil seeds, OMM was started. To improve the standard of living of the tribal people and to showcase their effort and hard work which remain unrecognized, OMM is been proved a remarkable step. It aims to promote consumption among the households - Due to urbanization and change in lifestyle; people are forgetting the essence of staple food. They are showing more inclination towards packaged and readily available foods which has a lot of ill effects. To revive the ancient fooding practices, OMM stressed on indulging millets in the fooding habits of people. Government has initiated various awareness programme regarding health benefits of millets. Organizing various cooking competitions at block & district level, efforts is made to develop interest of people towards millets consumption. Different recipes of millets and ready to eat food made from millets such as ladoos and bakery items are displayed in exhibitions, workshops and sold in local shops. Moreover, steps are also taken to improve productivity of millets: Government has set up diverse seed centers to provide quality seeds to farmers for

better production. Various training, workshops are also organized in village level to enhance the production of millets. Steps are taken for purification, multiplication and spread of seeds for qualitative millets production. Efforts are made to promote millets in urban areas. Promotional campaigns are organized at urban areas to highlight the nutritional benefits of millets among the urban mass. To improve the marketing of millets, social, mobile and cart outlets strategies are adopted. The Government Collaborate with NGOs to target the local people and make them understand the importance of millets. NGOs functioning at local areas conduct workshops and exhibit items prepared from millets to aware people about the health benefits of millets.

Government measures to promote millets consumption

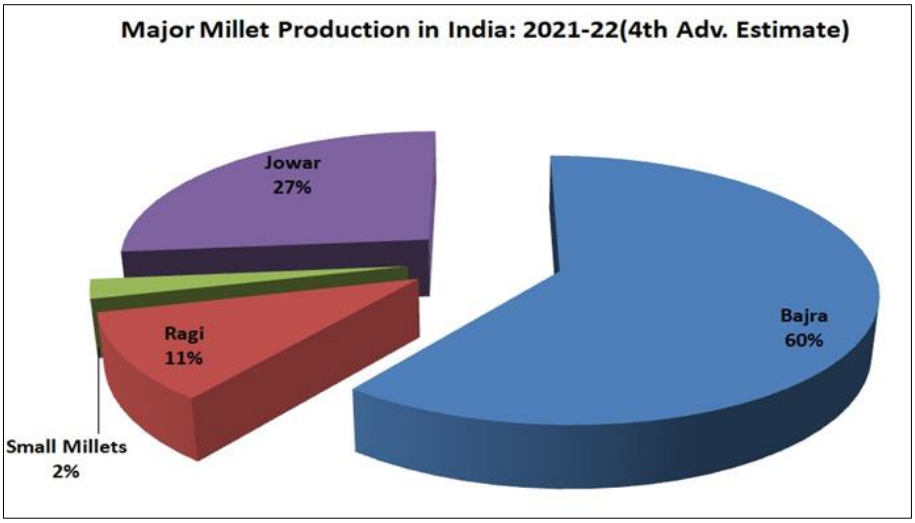
Odisha is the first state to include millets in public distribution system. For this exemplary step, Odisha has gained appreciation from NITI Aayog (National Institution for Transforming India). Government has also taken excellent step to promote millets government by including it in mid-day meal programmes and Integrated Child Development Service scheme. Such measure has proved to be instrumental to boost millet consumption in regular households. As per data, as many as 26, 495 farmers of the state have been registered under the OMM. Besides, around 90% of the harvested yield has been procured in the previous year. This enhances the capitalization of their produce. With an aim to balance out production and procurement, the Government has also replaced rice with ragi (millets) in public distribution system. By replacing rice with ragi, the nutritional value of grain consumption in rural households has improved a lot. With such brilliant steps, apart from strengthening the agricultural sector in the state, Government has also guaranteed food security for the people. OMM has been successful in the state due to the government's active procurement of millets at minimum support price, large number of farmers' registration into the programme and set - up of storage godowns for the grains in every district. Therefore, this project has increased production and consumption of millets in the identified regions by improving agronomic practices and setting up decentralized processing units which has played a vital role for safe processing of the produce.

Climate suitability for millets

Odisha is now an enormous rice and maize producing state in India. Certain experiments on rice and maize in different districts of Odisha represent the productive potentiality of the state. Mohapatro *et al.,* (2021) [7], Mohapatra and Shankar (2022) [6] reported that the soil was very suitable in producing the average maize yield in Gajapati district of Odisha which was at par with the maize production of India. Warm temperate is necessary for the sprouting and germination of the millet seeds. Though, millets are susceptible to damage by cold weather and frosts, it is important to keep the soil temperature cozy. 20-30 degrees Celsius is sustainable temperature for the growth of millet. Since, millets have a short growing season; they can be grown in less fertile soil. For instance, Sorghum can be grown in drought prone areas. Due to its excellent water holding capacity and presence of waxy coatings on its stems and leaves, most millet can grow with little moisture. Since, millets do not require high amounts of moisture, there are 8 types of millets in India which are cultivated under rain-fed conditions and require little or no irrigation. Minor millets require below 35cm of rainfall, while major millets require at least 40cm of rainfall. Due to moisture and cff rainfall requirement, millets such as Jowar, Ragi, Bajra, Sorghum, etc. are grown as Kharif crops and cultivated between June to November.

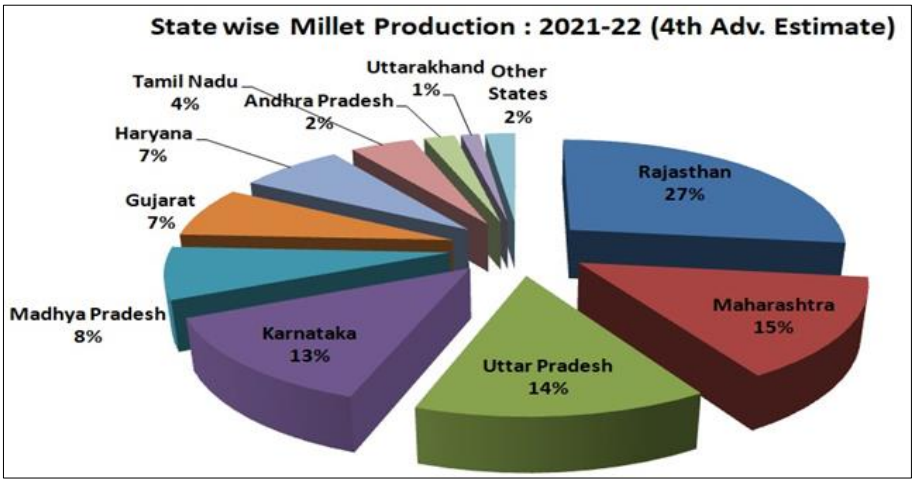
Production

- World production of millets in the year 2020 was 30.464 million metric tones (MMT) and India's share was 12.49 MMT, which accounts to 41 percent of the total millet production.
- Millet production has remained relatively stable over the past few years, with an estimated production of 28 million metric tons in 2020.
- The production of millets in India has increased from 14.52 million tonnes in 2015-16 to 17.96 million tonnes in 2020-21.



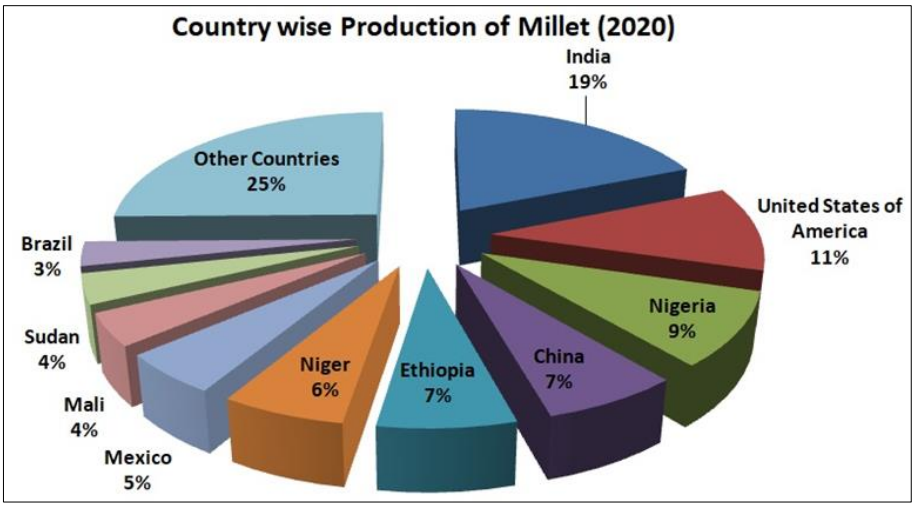
Source: Odisha Millet Mission, 2023

Fig 1: Major millet production in India: 2021-22 (4th adv. Estimate)



Source: Odisha Millet Mission, 2023

Fig 2: state wise millet production: 2021-22 ((4th adv. Estimate)



Source: Odisha Millet Mission, 2023

Fig 3: Country wise production of millet (2020)

Scope and future aspects of millets in Odisha

The scope of millets production has taken a different landscape in Odisha. Due to the excellent initiative taken by Government to promote the significance of millets, the unrecognized grain has achieved a new place in Odisha's agricultural sector. Lately, Government has come up with a new initiative, to replace snacks served in Government programs with items prepared from millets. This step holds utmost relevance to recognize the importance of millet. OMM has brought many positive changes in popularizing the health benefits of millets. Tribal communities who are solely dependent on millets production have been benefitted a lot through OMM. At present scenario, millets demand is increasing day by day. People are including it in their fooding practices. The nutritional benefits of millets are gaining recognition. Therefore, in coming years, millets will be preferred largely and it will be counted as primary food. Moreover, it will also gain recognition in international market in near future.

Health benefits of millets

Millet are powerhouse of nutrients, it possess high protein, iron & calcium. Apart from being gluten-free, millets can increase body immune system and accelerates weight loss. Hence, millets have miraculous health benefits. Moreover, millets are rich in both soluble and insoluble dietary fiber which provides wholesome benefits to the body. Besides, consuming millets on regular basis improves digestion and minimizes the risk of colon cancer. Being rich in antioxidants, they lower cholesterol and blood sugar levels. Since, millets are rich in fiber; they combat against occurrence of gallstones and heart ailments.

Conclusion

By replacing millets with packaged and junk foods various health benefits can be achieved. High nutrients composition boosts immunity and increases overall development of health. By several Governments' initiative, millets are slowly becoming a household name. The demand of millets is also increasing gradually and large employment opportunities are being created through millets production.

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