

## Small Millets: An Overview, Status, Health Benefits and Future Scope

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### Introduction

Millets are a storehouse of most of the nutrients required for the normal functioning of the human body. These crops are rich in micronutrients and minerals, four to five times more than others. The millets are essential for nutritional security due to the high number of amino acids. Most importantly, millets stand out from other cereal crops due to their low to zero gluten content and glycemic index.

After the Green Revolution, over-reliance on common cereals and sedentary lifestyles have led to an increase in health-related diseases such as obesity, diabetes, coronary diseases, gastrointestinal disorders and the risk of colon, breast and esophageal cancer. Being rich in fiber, antioxidants, minerals, phytochemicals, polyphenols and proteins, millets act like an elixir to fight health-related disorders. These crops improve digestion due to their high fiber content. It keeps the mind calm, relieves problems like depression, stress and insomnia. Millets contain tryptophan, an amino acid that makes the stomach feel full so that hunger is not felt for longer. Thus, it proves to help for prevent weight gain. Boon for pregnant women due to its high calcium and iron content. Most importantly, the quality of protein in these crops can be a good for diabetes, high blood pressure and heart disease patients due to their gluten-free and low glycemic index.

### Salient features

#### Crop like a grasses of antiquity-traditional cropping systems

- Ethnic foods & diversity (Planting time/ Crop Duration)
- Suitable for dry lands & important in hill and tribal agriculture
- Food & Fodder security of disadvantaged regions
- Require less water, mature early and cultivated in scarcity conditions, but also cultivated in high as well as low rainfall areas.
- Highly resilient in adapting to different ecological conditions.

- Ideal crops for climate change as well as contingency planning
- Nutritional security called as a Superfood / Miracle food / Nutricereals

#### Unique nutritional properties

High fiber, calcium, Fe	Quality protein	Mineral composition Zn & Mg	Low Sugar. high Storage ability Low GI and Gluten free
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#### Small Millets - Specialty

- Grow well under poor soils but yields are very low
- Easy crop management practices
- Availability of large germplasms - new improved varieties
- Low seed rate required (2 kg transplanting & 4 kg for sowing/ acre)
- Very less pest and diseases are occurred in summer NO pest/ diseases
- They are very much suited for harsh environment and quick to recover
- More suitable crops for climate change. Sowing window is June to Feb.
- Accumulation of standy water in crop does not suitable during early crop growth stage
- Highly nutritional and wide scope for value addition

#### Millets -Situation Analysis (Patil *et al.*,2023).

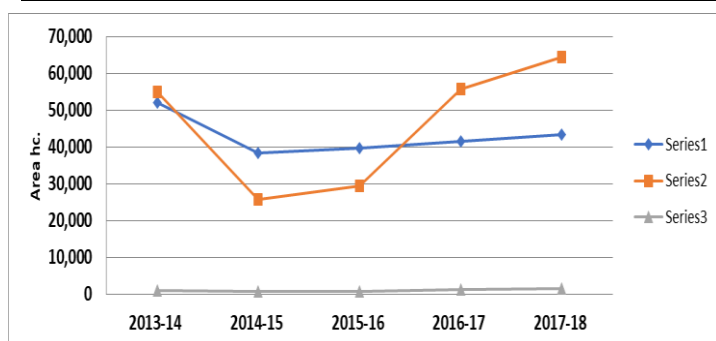
- Area decline continuing.... last 50 years
- Highest in Production due to increasing productivity
- Productivity of ragi highest among minor millets
- Increasing demand due International Year of Millets-2023
- Low price for produce but high cost of selling
- Agronomical package of practices are available for higher grain yield
- Scope for Value addition is very High....but less no. of products observed in market
- Nutritional importance of Human food was decreased & more concentrate given to 'TEST'

## Causes for Low Productivity of Small Millets (Patil et al.,2023)

- Millets are grown under rainfed, on marginal lands with low organic matter content
- Poor and erratic or heavy distribution of rainfall...mostly in crop grown area
- Lack of soil and water conservation measures
- Mono-cropping or Traditional mixed cropping
- Poor crop management practices *ex. throws the seedlings*
- Inadequate knowledge and adoption of new improved/ high yielding varieties
- Low seed replacement rate
- Imbalanced use of fertilizers
- Labour problem/ lack of mechanization
- Non availability of inputs on time
- Non availability of draft power for field operations

**Table 1: Area, Production and Productivity trends of crops (from 2013-14 to 2017-18) in Gujarat states (Patil et al.,2023)**

Sr. No	Year	Area (ha)	Production (kg)	Productivity (kg/ha)
1	2013-14	52,000	55,016	1058
2	2014-15	38,300	25,690	819
3	2015-16	39,580	29,368	742
4	2016-17	41,640	55,830	1341
5	2017-18	43,500	64,380	1480



**Fig. 1 Area, Production and yield (2019-20)**

## Health Benefits of Small Millets

- Best for losing weight; Better for bone health; Helpful for diabetes patients
- Useful for lowering blood Cholesterol; Reduces the Anaemia
- Good alternative for food allergies; Light food for body relaxation-Gluten Free and Low GI
- White ragi benefitted more than red ragi for Ca content and low in Tanin content
- Finger Millet/ Ragi for Protein/ Amino Acids: contains Tryptophan, Threonine, Valine,

Isoleucine and Methionine amino acids. Isoleucine helps in muscle repair, blood formation, contributes to bone formation and improves skin health. Valine is essential amino acid which facilitates metabolism, helps in muscle coordination and repair of body tissues. Sulphur is essential for production of Glutathione - body's natural antioxidant.

- Millets are also called as "Activated Millets"
- High dietary fibre content in grain checks constipation and results in better digestion,
- Phyto-chemical and anti-oxidant properties: The Phyto-chemical properties of small millets may help to provide protection from diseases such as cancer, diabetes, heart disease and hypertension.
- Foxtail Millet- May Help Control Blood Sugar and Cholesterol
- Sprouting (Malting)-Millet Makes Some Minerals More Available
- Small Millets-Show High level of Antioxidant Activity
- Naturally Gluten-Free Small Millets Grains
- Millet Consumption Decreases Triglycerides and C-Reactive Protein in Body
- useful in preventing cardiovascular disease (Patil et al.,2023).

## Future Scope of Small Millets in Gujarat

- Small millets are grown on marginal lands with low organic matter content under rainfed in *Kharif* or as a annual crop on fertile soils with irrigation facilities
- Suited for harsh environment and quick to recover suitable crops for climate change
- Less soil preparations and water conservation measures required
- Scope for- Monocropping / Intercropping
- Improved crop method of cultivation is available
- Very Less pest and diseases are occurred
- Availability of new improved/ high yielding varieties
- Low seed rate required (4 kg transplanting & 8 kg for sowing)
- Required less Fertilizers
- Solve the Labour problem as availability of thresher & hullers, too.
- Highly nutritional thus wide scope for processing & value addition thus has big export potential.

## Conclusion

Millets are highly nutritious or a storehouse of nutrients, with diversifying uses in human food,

animal feed-fodder, pharmaceutical use and commercial starch production. Utilization of Millets for Alternative Uses of Millets are traditionally used for preparation of fermented foods and beverages.

### References

H. E. Patil & G.D. Vadodariya (2023). A conclave Compendium Abstracts book during National Conclave on Millets (Shree Anna) for Sustainable Agricultural and Nutritional

Security Towards Global Prosperity: Key Challenges and Future Prospects published by Centre for Millets Research, S. D. Agricultural University, Deesa, Gujarat, *Small millets: Conventional Improvement, Bio fortification and Practical Achievement* by; Hill Millet Research Station; Navsari Agricultural University, Waghai. Pp.52-68.

**Table 2: Botanical details of Small Millets**

Sr. No.	Common name	Vernacular names	Scientific name	Chromosomes numbers	Place of domestication
1.	<b>Finger millet</b>	Ragi, mandua, Nagli, Kapai, Madua	<i>Eleusine coracana</i> L. Gaertn.	2n=36 (4x)	Ethiopia, African high lands
2.	<b>Foxtail millet</b>	Kang, Korra, Navane, Tenai, Rala	<i>Setaria italica</i> L. P. Beauv.	2n=18 (2x)	Central Asia, India
3.	<b>Kodo millet</b>	Kodo, Varagu, Haraka, Arikalu	<i>Paspalum scrobiculatum</i> L.	2n=40 (4x)	India
4.	<b>Little millet</b>	Kutki, Samai, Same, Samalu, Vari, Gundli.	<i>Panicum sumatrense</i> Roth.	2n=36 (4x)	India
5.	<b>Proso millet</b>	Cheeno, Panivaragu, Variga, Baragu	<i>Panicum miliaceum</i> L.	2n=36 (4x)	Central Asia, India
6.	<b>Indian Barnyard millet</b>	Madira, Sawan, Kuduraivali, Oodalu, Banti	<i>Echinochloa frumentacea</i> Link.	2n=54 (6x)	India
7.	<b>Japanese Barnyard millet</b>	Madira, Sawan, Kuduraivali, Oodalu, Banti	<i>Echinochloa utilis</i> ohwi et yabuno.	2n=54 (6x)	East Asia

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