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"Millets: Types, Nutritional value, Processing methods and applications in processed food"

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Introduction and Aim

Millet grains are beneficial as they are known as a climate resilient crop; yield is exceptionally good in those areas which are known for water scarcity. It is highly nutritious, and its uptake can fight the disease disorders of life. Millets are minuscule, and their high nutrient content is contributed by carbohydrates (60-70%), proteins (7-11%), crude fiber (2-7%) and fat (1.5-5%). Bajra or Pearl Millet (*Pennisetum americanum*), Ragi or Finger Millet (*Eleusine Coracana*), Foxtail Millet (*Setariaitalica*), Samai or Small round millet (*Panicum military)*, Haraka or Kodo Millet (*Paspalum scrobiculate*), Proso Millet (*Panicum miliaceum*), Banti Millet (*Echinochloa frumentacea*) is an important millet grown in Asian and African countries. There are distinct methods of processing food in industries these days. The incorporation of millet in the different processed foods is making people a step closer to a healthy life. Methods of the processing of millets are Fermentation, Malting, Milling, and Soaking. The glory of the millet is that it can be taken in different food items.

Types of Millets

Name	Local Name	Species
Pearl Millet	*Pennisetum glaucum*	Bajra
Finger Millet	*Eleusine coracana*	Ragi, Mandua
Foxtail Millet	*Setaria italica*	Kangni
Kodo Millet	*Paspalum scrobiculatum*	Kodra,Harika
Little Millet	*Panicum miliare*	Kutki,Sama
Barnyard Millet	*Echinochlo spp*	Sanwa, Shyama
Sorghum	*Sorgum bicolor*	Jowar
Porso Millet	*Panicum miliaceum*	Cheena, Bari

Agricultural Importance of Millets

1. The demand for food increases dramatically with the growing world population.

2. Growing water demands for various crops such as rice, sugarcane, and cotton increased by 0.009% measured by distance from the water table, resulting in a loss of about 7,191 liters of groundwater per hectare during irrigation(3).

3. In dry areas, the production of important staple foods is much lower as the world already faces low water levels and low rainfall, especially in Rajasthan and Haryana.

4. Millet cultivation can be a solution to this problem as millet can grow with little irrigation; on soils with low fertility and acidic to alkaline soils with a pH of 4.5 to 8 and have many nutritional benefits.

5. Millet belongs to the C4 grain category, which absorbs more carbon dioxide from the environment and turns it into oxygen, making it water efficient, so it requires less input and is more environmentally friendly (5).

Nutritional Value of Millets

1. India holds more numbers in terms of undernourished country in count approximately 15.2 %.

2. According to the global hunger report of 2017, India holds 10th position among the 119 countries.

3. Millet is in the sixth position in terms of cereal grains agricultural production and a staple crop in distinct regions.

Macro and Micronutrients Present in the Millets are:

- The protein content of finger millet is 4.76 to 11.70g/100g higher than the average.
- Proso millet consists the highest protein content among all millets and essential amino acids like leucine, isoleucine, and thiamine.
- Lipid content reported in pearl millet is highest in all the staple crops (1).
- Barnyard millet which contains an average content of crude fiber of 12.8g/100g.

4. Millet has folds higher mineral content in comparison to wheat and rice i.e., 1.7 to 4.3/100g.

5. The foxtail millet has more thiamine content approximately 0.60mg/100g.

6. This shows that adding millet to the diet can help overcome nutrient deficiencies.

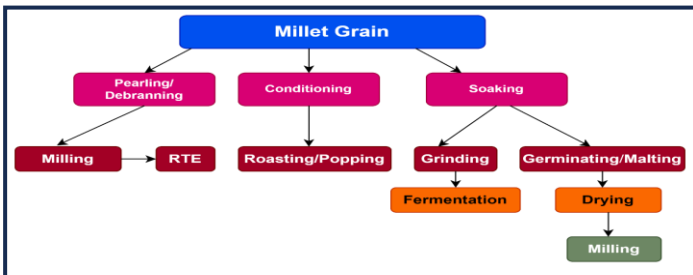

Fig.3.Schematic diagram of processing of millets

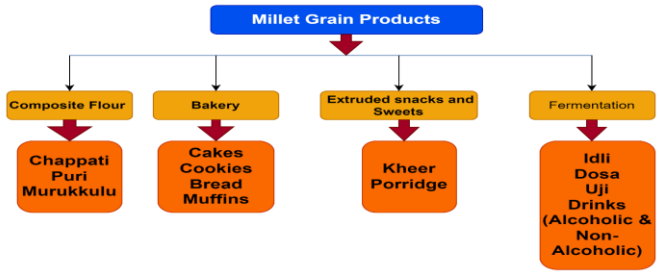

Fig.4:.Schematic diagram of processing of millets

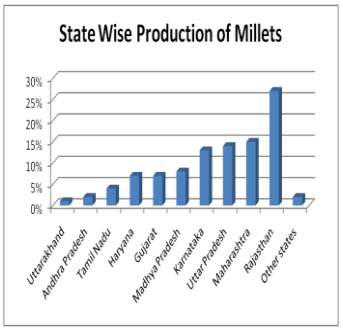

Fig.1.Statewise millet production

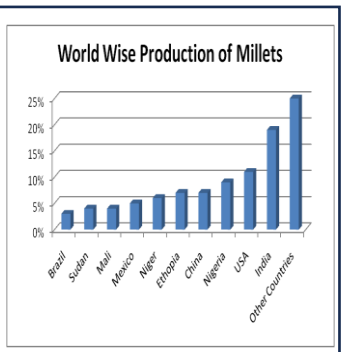

Fig.2.Worldwise millet production

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