



## Millets: The Nutri-Cereals

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Millets are traditional grains, grown and consumed in the Indian subcontinent from the past more than 5000 years. Millets are small - grained, annual, warm - weather cereals belonging to grass family. They are rain - fed, hardy grains which have low requirements of water and fertility when compared to other popular cereals. They are highly tolerant to drought and other extreme weather conditions. Millets are nutri- cereals comprising of sorghum, pearl millet, finger millet (Major millets) foxtail, little, kodo, proso and barnyard millet (minor millets). These are one of the oldest foods known to humanity. These are one of the several species of coarse cereal grasses in the family poaceae, cultivated for their small edible seeds. Pseudo millets are so called because they are not part of the Poaceae botanical family, to which 'true' grains belong, however they are nutritionally similar and used in similar ways to 'true' grains.

Millets are highly nutritious, non-glutinous and non-acid forming foods. Millets have many nutraceutical and health promoting properties especially the high fiber content. Millets act as a probiotic feeding for micro - flora in our inner ecosystem. Millets hydrate our colon to keep us from being constipated. Niacin in millet can help lower cholesterol. Millets contain major and minor nutrients in good amount along with dietary fiber. Millets are gluten free and can be a substitute for wheat or gluten containing grains for celiac patients.

### Nutritional Composition of various types of Millets with their Local Name

Millets are high in nutrition and dietary fiber. They serve as good source of protein, micronutrients and phytochemicals. The millets contain 7-12% protein, 2-5% fat, 65-75% carbohydrates and 15-20% dietary fiber. The essential amino acid profile of the millet protein is better than various cereals such as maize. Millets contain fewer cross-linked prolamins, which may be an additional factor contributing to higher digestibility of the millet proteins. Similar to cereal proteins, the millet proteins are poor sources of lysine, but they complement well with lysine - rich vegetables (leguminous) and animal proteins which form nutritionally balanced composites of high biological value. Millets are more nutritious compared to fine cereals. Small millets are good source of phosphorous and iron.

Millets contributes to antioxidant activity with phytates, polyphenols, tannins, anthocyanins, phytosterols and pinacosanol present in it having important role in aging and metabolic diseases. All millets possess high antioxidant activities.

### Major Millets

#### Sorghum (Jowar)

- Major portion of sorghum protein is prolamin (kaffirin) which has a unique feature of lowering digestibility upon cooking which might be a health benefit for certain dietary groups.

- Sorghum proteins upon cooking are significantly less digestible than other cereal proteins, which might be a health benefit for certain dietary groups.
- It is rich in protein, fibre, thiamine, riboflavin, folic acid, and carotene.
- It is rich in potassium, phosphorus and calcium with sufficient amounts of iron, zinc and sodium.

#### **Pearl Millet (Bajra)**

- Pearl millet contains considerably high proportion of proteins (12-16%) as well as lipids (4-6%).
- It contains 11.5% of dietary fiber. It increases transit time of food in the gut. Hence, reduce risk of inflammatory bowel disease.
- The niacin content in pearl millet is higher than all other cereals.
- It also contains folicate, magnesium, iron, copper, zinc and vitamins E and B- complex. It has high energy content compared to other millets.
- It is also rich in calcium and unsaturated fats which are good for health.

#### **Finger Millet (Ragi)**

- Finger millet is the richest source of calcium (300-350 mg/100g)
- Ragi has the highest mineral content.
- It contains lower levels of protein (6-8%) and fat (1.5-2%)
- Finger millet proteins are unique because of the sulphur rich amino acid contents.
- The grains have excellent malting properties and are widely known for its use as weaning foods.
- It has high antioxidant activity.

#### **Minor Millets**

##### **Foxtail millet (Kakum)**

- It is high in carbohydrates.
- It has double quantity of protein content compared to rice.
- It contains minerals such as copper & iron.
- It provides a host of nutrients, has a sweet nutty flavour and is considered to be one of the most digestible and non - allergic grains.

##### **Kodo millets (Kodon)**

- It has high protein content (11%), low fat (4.2%) and very high fibre content (14.3%).
- Kodo millet is rich in B vitamins especially niacin, pyridoxin and folic acid as well as the minerals such as calcium, iron, potassium, magnesium and zinc.
- It contains a high amount of lecithin and is an excellent for strengthening the nervous system.

##### **Barnyard millet (Sanwa)**

- It is the richest source of crude fiber and iron.
- Its grains possess other functional constituents i.e., Gamma amino butyric acid (GABA) and Beta - glucan, used as antioxidants and in reducing blood lipid levels.

##### **Little millet (Kutki/Shavan)**

- It is smaller than other millets.
- It is high in iron content.
- It has high antioxidant activities.
- It contains about 38% of dietary fiber.

##### **Proso millet (Chenna/Barri)**

- It contains the highest amount of proteins (12.5%).
- Health benefits of proso millet come from its unique properties. It has significant amounts of carbohydrate and fatty acids.

- It is cheaper source of manganese as compared to other conventional sources like spices and nuts.
- It contains high amounts of calcium which is essential for bone growth and maintenance.
- It reduces cholesterol levels and also reduce the risk of heart diseases

### **Pseudo Millets**

#### **Amaranth (Ramdana/ Rajgira)**

- High protein content (13-14%) and a carrier of lysine, an amino acid that's missing or negligible in many other grains.
- Consists of 6 to 9% of oil which is higher than most other cereals. Amaranth oil contains approximately 77% unsaturated fatty acids and is high in linoleic acid.
- It is high in dietary fibre.
- High in iron, magnesium, phosphorus, potassium and appreciable amounts of calcium.
- A rich dietary source of phytosterols, with cholesterol - lowering properties.
- Contains a lunasin - like peptide and other bioactive peptides which are thought to have cancer - preventive and antihypertensive properties.

#### **Buckwheat (Kuttu)**

- It contains protein 13-15% protein and rich in the amino acid lysine.
- Rich in carbohydrates (mainly starch).
- Contains vitamins B1, C and E.
- Rich in polyunsaturated essential fatty acids, such as linoleic acid.
- Contains higher levels of zinc, copper, and manganese than other cereal grains, and the bioavailability of these minerals is also quite high.
- High in soluble fiber.
- A rich source of polyphenol compounds.
- Contains rutin, a bioflavonoid thought to help control blood pressure and possess anti - inflammatory and anti - carcinogenic properties.

### **Why one should eat millets?**

Millets are gluten-free, highly nutritious and rich in dietary fiber. They are rich in micronutrients, including calcium, iron, phosphorus, etc. They are low in Glycemic Index (GI) as such don't cause huge spike in blood sugar. Millets should ideally be an integral part of our daily diet. Dietary fiber in millets has water absorbing and bulking property. It increases transit time of food in the gut which helps in reducing risk of inflammatory bowel disease and acts as detoxifying agent in the body.

### **Health benefits of Millets**

- ✓ Millets are anti acidic;
- ✓ Millets are gluten free;
- ✓ Helps to prevent type 2 diabetes;
- ✓ Effective in reducing blood pressure;
- ✓ Reduces risk of gastrointestinal conditions like gastric ulcers or colon cancer;
- ✓ Eliminate problems like constipation, excess gas, bloating and cramping;
- ✓ Millet act as a probiotic feeding micro flora in our inner ecosystem.

### **Conclusion**

Small millets are traditional staple food in dry land areas and are well known as Nutri-cereals due to high nutrient content. The most important cultivated species of small millets are Foxtail millet (Kangni), Finger millet (Mandua), Little millet (Kutki), Kodo millet, Barnyard millet (Jhangora), and Proso millet (Cheena). Minor millets are loaded with full of macro- and micro-nutrients like Ca, Mg, Mn, Zn, Fe, phosphorous, fibre, B complex vitamins.

Millets have nutraceutical properties in the form of antioxidants which are essential to human body. These minor millets perform well in marginal land, require very less water for their cultivation and can withstand severe climatic conditions. Small millets are more environment friendly with high water use efficiency and low input requirement, which make them farmer friendly. Therefore, there is need to develop new high yielding varieties to increase the area under minor millets crops to achieve nutritional security in the country.