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ORIGINAL PAPER



Nutri-Cereals for Human Health

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Nutri-cereals or millets are a group of small grained cereal food crops which are highly tolerant to extreme weather conditions and drought and are grown with low chemical inputs such as fertilizers and pesticides. Most of millet crops are native to India and are popularly known as Nutri-cereals as they provide most of the nutrients required for normal functioning of human body. Millets are classified into Major Millets and Minor Millets based on their grain size. 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 gluten free and non-allergenic their consumption decreases triglycerides and C-reactive protein, thereby preventing cardiovascular diseases. All millets are rich in dietary fibre. Dietary fibre 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. Nutritionists promote millets, as they are gluten-free, highly nutritious and rich in dietary fibre. They are rich in micronutrients, including calcium, iron, phosphorus, etc. They are low in Glycemic Index (GI) and don't cause huge spike in blood sugar. Thus, millets should ideally be an integral part of our daily diet. Millets also act as a probiotic feeding micro flora in our inner ecosystem. Millets hydrate our colon to keep us from being constipated. Millets contain major and minor nutrients in good amount. They serve as good source of protein, micronutrients and phytochemicals. Millets contain 7-12% protein, 2-5% fat, 65-75% carbohydrates and 15-20% dietary fibre. 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, anthocyanin and phytosterols present in it having important role in aging and metabolic diseases. All millets possess high antioxidant activities.

MAJOR MILLETS

Pearl millet (Bajra)

- i. Pearl millets contain carbohydrates that are digested slowly and maintain a stable glucose level for a long period which makes it good option for diabetics.
- ii. It is rich in dietary fibre and cholesterol-lowering properties which are good for heart patients.
- iii. Being non-glutinous makes it a healthy option for people with gluten allergy and celiac disease.
- iv. These millets are power-packed with carbohydrates, essential amino acids, antioxidants, multiple vitamins like thiamine, riboflavin, folic acid, niacin, beta carotene, and minerals like iron, phosphorus, magnesium, and zinc.
- v. Pearl millets are one of the few foods which reduce the acidity of the stomach thereby limiting ulcer formation and discomfort due to frequent bouts of acidity.

Sorghum (Jowar)

- i. Sorghum is rich in vitamins and minerals like B vitamins, magnesium, potassium, phosphorus, iron, and zinc.
- ii. It is also an excellent source of fiber, antioxidants, and protein.
- iii. Half a cup (96 g) of sorghum provides approximately 20% of the recommended daily fiber intake.
- iv. Major portion of sorghum protein is prolamins (kaffirin) which has a unique feature of lowering digestibility upon cooking which might be a health benefit for certain dietary groups.
- v. Sorghum proteins upon cooking are significantly less digestible than other cereal proteins, which might be a health benefit for certain dietary groups.

Finger Millet (Ragi)

- i. Finger millet's phytochemicals help in slowing digestion process which helps in controlling blood sugar level in condition of diabetes.
- ii. Finger millet contains about 5–8% protein, 1–2% ether extractives, 65–75% carbohydrates, 15–20% dietary fiber and 2.5–3.5% minerals.

- iii. Among all the cereals and millets, finger millet has the highest amount of calcium (344mg%) and potassium (408mg%).
- iv. The cereal has low fat content (1.3%) and contains mainly unsaturated fat. 100 grams of Finger millet has roughly on an average of 336 KCal of energy.
- v. Finger millet is a very good source of natural Iron and its consumption helps in recovery of Anaemia.
- vi. Finger millet could help in keeping malnutrition, degenerative diseases and premature aging at bay.

MINOR MILLETS

Foxtail millet (Kakum)

- i. Foxtail millet is a rich source of fiber, protein, zinc, and magnesium.
- ii. It also contains a reasonable amount of iron and calcium, which are essential for our bone health.
- iii. Foxtail millet has a moderate glycemic index (GI) of 59, which means it will not spike your blood sugar levels quickly.
- iv. Foxtail millet boasts plenty of B vitamins such as thiamin (B₁), riboflavin (B₂), niacin (B₃), and folate (B₉).
- v. Foxtail millet contains a considerable amount of potassium and magnesium, which may help reduce blood pressure.

Kodo millet (Kodon)

- i. Protein, fiber, and mineral content are much higher than the major cereals like rice.
- ii. Kodo millet is rich in vitamins, minerals, and phytochemicals containing sulphur.
- iii. It is also rich in essential amino acids, like lysine, threonine, valine, sulphur containing amino acids.
- iv. Kodo millets are rich in vitamin B3, vitamin B6 and folic acid as well as minerals such as calcium, potassium, magnesium and zinc.
- v. Millet is also rich in antioxidants and phenolics such as phytates, phenols, and tannins that may contribute to important antioxidant activity in health, aging, and metabolic syndrome..
- vi. Millets have higher amount of free radical scavenging activity which decreases the risk of cardiovascular diseases.

Barnyard millet (Sanwa)

- i. It is an excellent source of dietary fiber with a good amount of both soluble and insoluble fractions.
- ii. The grain encompasses the highest amount of fiber in comparison to other grains and millets with a serve providing 2.4 grams of fiber.

- iii. Barnyard millet is very high in dietary fiber and protein thus is more beneficial for diabetes than wheat and other grains.
- iv. Barnyard millets contain a lot of phytochemicals, such as polyphenols which protect us from many diseases, including heart diseases, diabetes, and cancer.
- v. Barnyard millet is low on carbohydrates and fat. It helps lower the total cholesterol levels in the body.

little millet

- i. Little millet contains magnesium which can help improve heart health.
- ii. Vitamin B3 (niacin) in little millet helps lower cholesterol.
- iii. Little millet is also a good source of phosphorus which, helps with fat metabolism, body tissue repair and energy production.
- iv. Little millet is a real health bomb and is rich in protein and fiber.
- v. It is also a rich source of calcium and iron, which are excellent for your bones. Besides, iron helps prevent anaemia and boosts your immune system.
- vi. Little millet is rich in dietary fiber, which will speed up your digestion.

Proso millet

- i. Proso millet contains high lecithin which supports the neural health system.
- ii. It is rich in vitamins (niacin, B-complex vitamins, folic acid), minerals (P, Ca, Zn, Fe) and essential amino acids (methionine and cysteine).
- iii. It has a low glycemic index and reduces the risk of type-2 diabetes.
- iv. Millets are a major source of energy and protein and have high nutritive value.
- v. Millets are also rich in micronutrients such as niacin, B-complex vitamins, Vitamin B6, and folic acid.
- vi. Proso millet contains dietary proteins that can have a natural ability to protect the liver.

PSEUDO MILLETS

Amaranth (Rajgira)

- i. Amaranth is rich in antioxidants, including gallic acid and vanillic acid which help fight free radicals.
- ii. Amaranth grain is high in protein and lysine, an amino acid found in low quantities in other grains.
- iii. Amaranth seeds contain significant amounts of lipids, carbohydrates, dietary fiber, vitamins and minerals.
- iv. Amaranth contains more calcium than other seeds, which makes it a valuable food that helps to have a healthy development of bones helping to prevent osteoporosis.
- v. It has been proven that Amaranth's oil can reduce total and bad cholesterol (LDL) increasing good cholesterol.

- vi. Amaranth starch binds water and thus helps to prevent constipation.

Buckwheat (Kuttu)

- i. Grain-like seed helps to reduce inflammation and lower LDL, or “bad cholesterol” levels, both of which are important for maintaining heart health.
- ii. This pseudo-cereal is very low on the glycemic index – this means that the carbohydrate content is absorbed slowly into the blood stream.
- iii. Buckwheat provides 6 grams of dietary fiber which helps to keep food moving smoothly through the digestive tract.
- iv. It contains antioxidants and phenolic compounds, which may help to fight certain types of cancer.
- v. This food rich in vitamins and minerals and is an excellent source of digestible plant protein.

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