

Millets Occur in Himachal Pradesh and their Contribution in Nutrition

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Introduction

Millets are small-seeded grains. Nowadays it is called the Nutri-cereals. Millets are also called the next generation of crops. Millets are gluten-free and have low glycermic index.

Minor millets are extensively cultivated in the tribal and hilly areas but have not received adequate attention for their varietal improvement. These have a common feature of capable of growing in very marginal sloppy fields without any input and are invariably grown under rain fed conditions (like in himachal pradesh) (Table 1).

Type of millets grown in himachal pradesh

- Finger millet
- Proso millet
- Foxtail millet
- Amaranth
- Buckwheat

Millets, their nutritional value and their health benefits

Table 1: Finger umillet.

Scientific name	<i>Eleusine coracana Gaertn.</i>
Common name	Ragi, koda, kodra, mandua, mandal, finger millet
Family	Poaceae
Growing period	May-September
Distribution	Shimla, Kullu, Sirmaur, Solan, Chamba, Kangra, Mandi, Lahaul-spiti and Kinnaur districts of state.

Ragi is cooked like rice, ground to flour for making roti and chila which is a pancake prepared from ragi flour batter. Sprouted grains are recommended for children and elderly people. A decoction of fresh plant is used against dysentery and constipation. Grains are also used to make liquor (arake or areki in ethiopia), brewing beer and its by product is used as livestock feed. Green ragi is used for treating blood pressure, liver disorder, and asthma and heart weakness. Whole plant is used for making baskets, mats and thatching of roof. (Table 2).

Table 2: Nutritional value.

Nutritional value	
Constituents	value (g per 100 g)
Moisture	10.89
Protein	7.16
Fats	1.92
Total fiber	11.18
Carbohydrates	66.82
Potassium	0.44
Phosphorus	0.21
Magnesium	0.15
Calcium	0.36
Iron	0.004
Energy (kj)	1324

Health benefits

- High dietary fiber helps in delayed nutrient absorption, increased faecal bulk, lowers blood lipids and prevents colon cancer.
- Ragi contains amino acid tryptophan which lowers appetite and helps in keeping weight in control, lecithin and methionine which helps in bringing down cholesterol level. It also contains threonine which hinders fat formation in liver and regulates cholesterol.
- It is a good source of natural iron and helps in curing anemia.
- Ragi is rich in minerals particularly calcium and potassium which help in strengthening bones and teeth. It is a good food for growing children, lactating mothers and ageing people.
- Ragi does not contain gluten which makes it a wonderful grain alternative for gluten sensitive people.
- Decreases adipose tissue, it brings down plasma triglycerides hence reduce cardiovascular diseases. Also it had a low glycermic index, polyphenol present act as anti-diabetic and antioxidant components.

Unique value: Ragi is a famine food as it ensures optimum yield under unfavorable climate conditions and its seeds can be stored for years without insect damage.

Photochemical: phytates, polyphenols, tannins and trysin inhibitory substance (Table 3).

Table 3: Proso millet.

Scientific name	<i>Panicum miliaceum L.</i>
Common name	Cheena, cheeni, proso millet
Growing period	June – September
Distribution	It is distributed in the temperate parts of Kinnaur, Shimla, Kangra, Sirmaur, Chamba, Mandi and Kullu districts of the state.

The grains are primarily used for human consumption. The whole grains are boiled like rice, roasted, cooked into porridge; ground and baked into flat bread or chapatti and cooked with to prepare kheer. Various preparations of proso millets are consumed during religious and ceremonial fasts. Crop residue is a nutritive fodder with 7% protein which has very high digestibility coefficient up to 45%. The grain is also used as feed for animals including pigs, poultry and pet birds (Table 4).

Table 4: Nutritional value.

Nutritional value	
Constituents	Value (g per 100 g)
Moisture	8.65
Protein	12.5
Fats	1.1
Total fiber	2.2
Potassium	0.2
Phosphorus	0.21
Magnesium	0.11
Calcium	0.01
Iron	0.001
Energy (kj)	1582

Health benefits

- Cheena contains higher protein than other millets whereas amino acids like lysine, methionine and tryptophan are two times higher than wheat and rice.
- Its protein is a potential therapeutic intervention in type-2 diabetes.
- Proso millet is rich source of B vitamin, especially vitamin B6 and folic acid.
- It has the ability to reduce cholesterol levels. Thus, reduces the risk of heart diseases and also prevents breast cancer.
- Antioxidants present in proso millet play important role in body immune system

Unique value: It is a short duration (65-70), drought resistant crop which is well adapted to less fertile soils.

Phytochemical: Phenolic acid, Ferulic acid, chlorogenic acid, syringic acid and caffeic acid.

Table 5: Foxtail millet.

Nutritional Value	
Constituents	Value (g per 100 g)
Moisture	14.32
Protein	8.92
Fats	2.55
Total fiber	6.39
Carbohydrates	66.19
Potassium	0.09
Phosphorus	0.1
Magnesium	0.12
Calcium	0.02
Iron	0.002
Energy (kj)	1388

Foxtail can be cooked as rice and consumed particularly on religious occasion or fasts. It is cooked in water and mixed in milk cream are consumed to cure chicken pox.

White coloured grains are specially used for curing fever and cholera. It is widely used as nourishing gruel/soup for pregnant and nursing women.

Grains are powdered and one spoon of powder is taken with warm water to cure fever and headache. Leaves are used as fodder to increase lactation of the milch animals (Table 5).

Health benefits

- It has low glycermic index which helps in controlling blood sugar level therefore an ideal food for patients with diabetes and gastric problems.
- It lowers triglycerides level, thus reduce the risk of heart attack.
- Linoleic acid and tocopherols present in foxtail millet enriches its antioxidant activity.
- It is an excellent source of fiber and protein rich in isoleucin, methionine, lysine, cystine, leucine and tryptophan.

Unique value: Kangni is rich in minerals and is a good source of copper and iron that keep the body strong and enhances the endurance and strength.

Phytochemicals-Alkaloids, phenolics, reducing sugars and flavonoids.

Table 6: Buckwheat.

Nutritional value	
Constituents	Value(g value per 100 g)
Moisture	9.75
Protein	13.27
Fats	3.4
Total fiber	10.1
Carbohydrates	71.5
Potassium	0.46
Phosphorus	0.35
Magnesium	0.23
Calcium	0.18
Iron	0.002
Energy (kj)	1435

Buckwheat is an acceptable eatable during fasting days. Its cutlets are prepared with grain flour mix with boiled colocacia and potato tubers. It is used for preparation of food products, alcoholic drinks and medicines. Its leaves are relished as vegetable as sole or in combination with pea/onion/potato and are also fried to prepare pakora with Bengal gram flour. Buckwheat hay, straw or whole crop is used a animal feed, mainly mixed with other fodders. Bloom of buckwheat is excellent nector for bee foraging (Table 6).

Health benefits

- It lowers the blood sugar, cholesterol and also prevents/cures arteriosclerosis and diabetes.
- It helps in weight loss, increase immunity and is important for better growth and development in children.
- Buckwheat flour is a physiologically functional food in curing hypertension.
- It contains 70% globulin protein which has a high digestible coefficient.
- Buckwheat proteins are rich in amino acids like lysine (5.5-6.1%), arginine, aspartic acid and contsin less glutamic acid, proline than cereal protein.
- It contain D-chiroinositol, a compound of the secondary messenger pathway for insulin signal transduction found deficient in Type 2 diabetes and polycystic ovary syndrome.
- Fagopyritrols helps in treatment of pateient with non insulin dependent diabetes mellitus.
- Chloline present in buckwheat increases the efficiency of liver.

Unique value: Rutin, a phytochemical present in buckwheat increases the strength and elasticity of arteries/veins and also regulates blood cholesterol level. Thus, an ideal food for blood pressure and diabetic patients.

Phytochemicals: Flavonoids, Rutin, Cholin, Fagopyritols, Quer cetin, Orientin, Homoorientin, Vitexin, Isovitexin, Tannins and Phenolic compounds.

Table 7: Amaranth.

Scientific name	<i>Amarathus hypochondriacus L.</i>
Common name	Saliara, Seul, chaulai, rajgiri, ramdana, amaranth
Growing period	March-June
Distribution	It is cultivated as a mixed crop or a field bunds and sole crop sporadicallu in almost all the districts of the state.

Table 8: Protein.

Protein	13.27
Fats	5.56
Total fiber	7.47
Carbohydrate	61.46
Potassium	0.41
Phosphorus	0.41
Magnesium	0.27
Calcium	0.16
Iron	0.008
Energy (kj)	1489

Popped and puffed seeds of amaranth are cooked as rice. Popped grains are used to prepare laddu after mixing with sugar syrup. Popped grains are boiled in milk to prepare kheer or mixed with curd/buttermilk to prepare raita.

Amaranth preparations are acceptable meals during fasting days in religious ceremonies. Boiled leaves after sieving water are fried to prepare chaulai ka saag. Leaves mixed with Bengal gram flour batter are fried to prepare pakora. Grains cooked in water as kheer are used in curing chicken pox and measles (Table 8).

Health benefits

- Amaranth decreases plasma cholesterol level, stimulates immune system, posses antitumor activity, helps in reducing blood glucose levels, improves hypertension and anaemia.
- Phytic acid present in amaranth leaves lower blood cholesterol and is helpful in cardiac problems.
- Amaranth does not contain gluten therefore it is suitable for person suffering from abdominal diseases.
- Popping of amaranth grains increases the protein quality and availability of amino acids.

Unique value: Minerals (calcium, magnesium, iron, potassium and zinc) and vitamins (thiamin B1, riboflavin B2, ascorbic acid and vitamin E) in amaranth seed are much higher in comparison to cereals.

Phytochemicals: Alkaloids, tannins, Flavanoids, phenolic compounds, glycosides and saponins.