



Importance of Minor Millets (Nutri Cereals) for Nutrition Purpose in Present Scenario

(*Himansuman, Himanshi Jhalora and Naven Kumar Meena)

Rajasthan College of Agriculture, MPUAT, Udaipur, Rajasthan, 313001

*Corresponding Author's email: himansuman.bhalothia@gmail.com

*Poshak Annaj Hai Gunno Ka Khazana
Sashta Sugam Hai Isse Kheto Mein Ugana*

Minor millets (Nutri cereals) are the groups of small seeded cereals belonging to the family *Poaceae*. There are upto thirty-five species of grasses from 20 genera are well known as small millets. The most important cultivated species of small millets are finger millet, foxtail, proso millet, barnyard millet, kodo millet and little millet. One of the minor millet namely barnyard millet is the richest source of calcium content, about 10 times that of rice or wheat. Minor millets are also full of micronutrients like Mg, Ca, Mn, tryptophan, phosphorous, fibre, and vitamins. These micronutrients act as antioxidants which are essential to human body. Additional specialty of minor millets is, they need very less water for their cultivation and can withstand severe climatic conditions. There is need of new high yielding, promotional strategies and policies are necessary to increase the area under nutri cereals crops to achieve nutritional security as well as sustain rainfed farming in the country.

Introduction

The second green revolution has to be nutrition oriented, which was neglected in production oriented first green evolution, to have inclusive and equitable growth and development of our country. The hidden hunger (Micronutrient deficiency) is very big problems in our country, particularly in the states like Bihar and Orrisa. Millets are hardy can be grown in poor soil and in dry zones as rain-fed crops. Millets are one of the oldest cultivated food grains known to humans and have been a staple food in Northern Africa for thousand years and was a staple food in China and India prior to popularity of fine cereals like rice and wheat. Millets are tiny in size, round in shape and minor cereals. It is characterized by their remarkable ability to survive in less fertile soil, drought-resistant, resistance to pests and diseases.

These crops have a long history of cultivation of more than 5000 years and grown in many states. Millets are also unique due to their short growing season and can be very well fitted into multiple cropping systems. These millets are ready to harvest in between 70-80 days. Millets are amazing in their nutrition content. Each of the millets is three to five times nutritionally superior to the widely promoted rice and wheat in terms of proteins, minerals and vitamins. They can provide nutritious grain and fodder in a short span of time. Their long storability under ordinary conditions has made them "famine reserves". The government has renamed jowar, bajra, ragi and other millets as "Nutri Cereals", dispensing with the nomenclature "coarse cereals".

Over the past three decades, the area under cultivation by these minor millets and their production has been decreased significantly. Thus, local adaptation and production of minor millets seems to be an important factor influencing its production and consumption.

Initiation of works with respect to collection and evaluation of different millet germplasms with high nutrition and tolerance against abiotic/environmental stresses will add some production enhancement and adoptability of minor millets. Therefore, it has been presumed that there might be some morpho-physiological, biochemical, and molecular approaches are needed for the characterization of minor millets.

Minor millet consumption and its Nutraceutical facts

The concepts of food consumption are changing from previous to present time. Previous emphasis has been on survival, hunger satisfaction, health maintenance and absence of adverse effects on health and current emphasis is on encouraging the use of nutraceutical foods which promise to promote better health and well being thus helping to reduce the risk of chronic diseases. In spite of several national nutritional intervention programs, India faces huge nutrition challenges as the prevalence of micronutrient malnutrition continues to be a major public health problem, with an associated economic cost of 0.8 to 2.4 per cent of the GDP. The millets are with higher fibre content, and their protein quality and mineral composition contribute significantly to nutritional security of a large section of population residing in the millet growing areas, considered to be the most disadvantaged groups.

Millets have nutraceutical properties in the form of antioxidants which prevent deterioration of human health. Millets are most recognized nutritionally for being a good source of minerals magnesium, manganese and phosphorus. Research has linked magnesium to a reduced risk for heart attack and phosphorus is important for the development of body tissue and energy metabolism. Finger millet is the richest source of calcium (300-350 mg/100 g) and other small millets are good source of phosphorous and iron. The protein content ranges from 7 to 12% and fat content from 1 to 5.0%.

Millets prevent many health problems such as lowering blood pressure, risk of heart disease, prevention of cancer and cardiovascular diseases, decreasing tumour cases etc. Other health benefits are increasing the time span of gastric emptying, provides roughage to gastro intestine. Millet is an alkaline forming food. The soothing alkaline nature of millet helps to maintain a healthy pH balance in the body, crucial to prevent illnesses. Millets also lower incidences of diabetes. Millets are good sources of magnesium that is known to be capable of reducing the effects of migraine and heart attack. Millets are rich in phyto-chemicals containing phytic acid which is known for lowering cholesterol. Celiac disease is an immune-mediated enteropathy triggered by the ingestion of gluten in genetically susceptible individuals. Millets are gluten-free, therefore an excellent option for people suffering from celiac diseases and gluten-sensitive patients often irritated by the gluten content of wheat and other more common cereal grains. Millets are known to be rich in phenolic acids, tannins, and phytate that act as “antinutrients” However; these antinutrients reduce the risk for colon and breast cancer in animals. Millets fraction and extract have been found to have antimicrobial activity. Seed protein extracts of pearl millet, sorghum, Japanese barnyard millet, foxtail millet, small millet and pearl millet were evaluated in vitro for its ability to inhibit the growth of *Rhizoctonia solani*, *Macrophomina phaseolina*, and *Fusarium oxysporum*. Protein extracts of pearl millet are highly effective in inhibiting the growth of all 3 examined phytopathogenic fungi.

Millets are nutritionally comparable or even superior to major cereals such as wheat and rice, owing to their higher levels of protein with more balanced amino acid profile (good source of methionine, cystine and lysine). These essential amino acids are of special benefit to those who depend on plant food for their protein nourishment. The millet grain contains about 65% carbohydrate, a high proportion of which is in the form of non starchy polysaccharides and dietary fibre which help in prevention of constipation and slow release of glucose. Lower incidence of duodenal ulcer and hyperglycemia are reported among regular

millet consumers. Millet grains are also rich in important vitamins *viz.*, Thiamine, riboflavin, folin and niacin.

Millets are easily available and cheap in cost. Millets contains many major and minor nutrients like carbohydrates, protein, fat, dietary fiber, vitamins and minerals as well as antioxidants and phytochemicals. The importance of this article undertakes to concern and to develop specific agenda for these crops which must be recognized as an important food and to introduce the millets as a nutritious food for fulfillment of the nutritional need of the global population and also to find ways to consume the millets effectively and to reduce the problems of malnutrition and other health problems.

Importance of millet in healthy life

Newly acquired life-styles has now given us diabetes, hypertension and cardiovascular disease running rampant. For the above diseases millets have returned as a viable option to live healthy life without consuming loads of anti-diabetic and anti-hypertension medicines that are not only very expansive but also have serious side-effects in the long run. Minor millets also act as a prebiotic feeding micro-flora in our inner ecosystem. Minor millets will hydrate human colon to keep us from being constipated. The high levels of tryptophan in minor millet produce serotonin, which is calming to our moods. Minor millet consumption decreases Triglycerides and C-reactive protein, thereby preventing cardiovascular disease. All millet varieties show high antioxidant activity. Millet is gluten free and non allergenic. Millets contribute towards balanced diet, and can hence ensure nutritional security more easily through regular consumption along with keeping the environment safe as they are low input crops mostly adapted to marginal lands. Declining small millets cultivation has resulted in reduced availability of these nutritious grains to needy population and also the traditional consumers have gradually switched over to more easily available fine cereals. This is a disturbing trend and needs urgent focus by the agricultural experts and policy makers. Immediate policy and market support, value addition and promotional activity are necessary for arresting the further decline not only in cultivation but also consumption. Improving productivity and enhancing demand should be the twin approaches. Productivity gaps even though sorghum, minor millet have seen significant productivity increases, wide productivity gaps remain when a comparison is made between the state average yield (SAY) and outputs from frontline demonstrations (FLD) organized under the Department of Agriculture and Cooperation (DAC). Yield gaps vary between states and per crop, but apply to 'large' and 'small' millets alike. These findings shed light on the enormous potential for improvement, as well as the great challenge that lies ahead. It is well known that germplasm resources are rich source of useful genes and have been successfully used in traditional breeding efforts to improve several crop plants. Identification of gene based trait specific molecular markers specially linked to nutritional traits will help in controlling these traits. Advent of next-generation sequencing platforms favors rapid sequencing of millet genome and there trait specific characterization. Omics information on millets should advance more rapidly as cereal crops in order to enhance their utilization in the fight against micronutrient malnutrition.

Conclusion and future prospects

The nutritional superiorities of millets over others cereals are well known, its advantages are not being exploited on commercial scale. Processing and value addition technology advances have made it possible to process and made available value-added products to households. One of the limiting factors for diversified food uses of small millets is lack of appropriate processing technologies to prepare convenient ready to eat value added products. Therefore, there is an urgent need for Indian policy makers to refocus their attention towards millet farming systems and enact policies that create an enabling environment for millet farmers.