

Millet: Processing and Utilization

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Abstract

An attempt has been made to develop a specific agenda for millet processing to improve the food and nutritional value and to promote use of millets for future perspective. The important reason for the declined consumption of millets is laborious and time-consuming procedures for food preparation. Researchers investigated the modifications in carbohydrates, proteins and lipids of millets by hydrothermal processing. Millet grains are having fibrous and tough outer layers which are difficult to digest and resistant to water permeability for cooking. Dehulling of millet grains are very difficult in traditional processing, over the years, processing equipment's were developed for cleaning, dehulling, polishing and grinding including flakes machines discussed in this paper.

Key words: Millets processing, Health benefits, Value addition.

Introduction

In Asia and Africa millets are cultivated. In developing countries millets are given importance owing to their remarkable health benefits as food. Normally millets are available without polishing in the market. Millets are rich in micronutrients, particularly minerals and vitamins. The outer most layers of millets are hard tough and difficult to digest, hence they are to be removed before any type of food preparation. Processing of millets in earlier days was done manually, which was tedious involves drudgery. People were not showing interest in processing operations of millets. As people become health conscious and wanted food items based on millets. Further with the introduction of millets processing machinery and involvement of self-help groups, millet products are produced and sent to markets. India leads with production of 10 million tones (in the year 2013) followed by Nigeria and Niger.

Review of Work on Processing and Utilization of Millets

Review of literature revealed that Kellogg (1896) reported that corn was soaked for 8 to 12 hours in water at a temperature between 40 to 60°C for securing a preliminary digestion and followed by cooking the grain in boiled water for about an hour or steaming for longer time. The steamed grain was cooled and partially dried and then passed through cold rollers for flattening the grain into extremely thin flakes. Flakes were then steamed and baked or roasted in an air oven until dry and crisp.

Shobhana and Malleshi (2007) observed that, endosperm of the millet can be hardened by the hydrothermal treatment enabling its decortication. Also, determined the optimal conditions for the hydrothermal treatment of sorghum. Bandara et al.(2007) designed and developed an efficient low cost rice flaking machine for production of rice flakes. The machine consists of two horizontal steel rollers rotating in opposite directions with a pressure applying system to flake paddy grains. The rotation speed of rollers is set 600 rpm the same machine used for sorghum flaking. Dayakarrao (2012) processed sorghum flakes by soaking sorghum grain in water at room temperature for overnight, drying in air for 3 hours, roasting for 5 minutes in a roaster at 200°C, flaking in edge runner, sieving, cooling and packing. The flakes resemble rice flakes and the output is 50-60%.

Minerals, Vitamins, protein content is more in millets and is a staple food resource. In developing country, because of inadequate supply of nutrition, several health problems like obesity, diabetes, cardiovascular disease, skin problems, cancer, celiac disease etc. and malnutrition are most prominent. This is mainly due to the lack of knowledge and less awareness in people and the little utilized agricultural crops as food. Millets are cheap in cost and easily available. There is a growing awareness of the nutritional value of the coarse cereals such as Jowar, foxtail millet and ragi, kodo millet, barnyard millet, proso-millet, little-millet and brown-top millet etc., to avoid any lifestyle diseases, such as diabetes and cardiovascular diseases.

Types of Millets

There are two types of millets

Major Millets:

1. Finger millet (*Eleusine coracana*).
2. Proso millet or white millet (*Panicum miliaceum*)
3. Foxtail millet (*Setaria italic*) and
4. Pearl Millet (*Pennisetum glaucum*), most widely used for consumption

Minor Millets:

1. Kodo millet (*Paspalum scrobiculatum*)
2. Barnyard millet (*Echinochloa spp.*)
3. Little millet (*Panicum sumatrense*)

Different millets are shown in below pictures.





Health benefits of Millets:

Because of their richness in protein, calcium, dietary fibre and polyphenols, millets have huge health benefits.

Table: Nutritional benefits of millets

Millets	Protein (g)	Fibre (g)	Mineral (g)	Iron (mg)	Ca (mg)
Foxtail Millet	12.3	8.0	3.3	2.8	31
Pearl Millet	10.6	1.3	2.3	16.9	38
Proso Millet	12.5	2.2	1.9	0.8	14
Finger Millet	7.3	3.6	2.7	3.9	344

- High in Fibre – Prevents Cancer
- High in Niacin – Lowers Cholesterol
- Decreases Triglycerides and Creative protein
- Rich in Slow Releasing Carbohydrates – Prevents and controls diabates
- Low in glycemic index - Prevents and controls diabetes
- High in Ca, Fe, Mg and Zn – Maintains muscle and nerve function

Reasons for less consumption of Millets:

As the outer most layers of bran are tough, fibrous and irritating to tongue, millets are not popular. It takes more time for cooking as the layers are resistant to water permeability. Millets need to be polished before grinding as they are sold unpolished. A variety of foods from sorghum and millets are traditionally prepared and consumed over centuries, in Indian sub-continent. In spite of millet's commendable nutritional adequacy, there is a continuous fall in per capita consumption both in rural and urban India. The decrease in per capita consumption

can be attributed to the drudgery in traditionally processing of sorghum by removing the hulls. Due to laborious and time-taking process for preparing food, Government policy to supply fine cereals at subsidized prices, sorghum consumption is less.

Processing of millets

Post-harvest technology advanced new techniques and value addition are getting wide acceptance in urban and rural areas. Many food processing technologies have been developed in relation with the convenience of food uptake and nutritional quality. Decortication, milling, germination/malting, soaking, fermentation etc. are the food processing techniques used to increase the nutritional value which highly helpful in dealing with undernourishment problem. Commercialized use and large scale implementation of these technologies will help in easier adoption of the products at wide scale. Great profits can be obtained by all the persons in chain from producer (like farmers) to the consumers, but this will require policy-support and campaign for nutritional benefits and ecological sustainability of the crop.

Utilization of Millets and need for suitable machinery

Dehulled grain is then transformed into various value-added products like flour, composite flours, traditional snacks and savories, expanded, flaked, popped, puffed, RE breakfast products etc. Flaking of millets has been successfully attempted adapting the normal cereal flaking methods using edge runner machine. Millet flaking would be a new avenue for wide spread utilization and better shelf-life to the flakes.

Multi grain flour, Puffing or popping, Malt, Weaning foods, Noodles ,Extruded Products, Bakery products, Fermented Food (Idly, dosa, etc...), Ragi soup

Veg. Oil Fried Products

Conclusion

An attempt has been made in this paper to promote millet processing technologies to introduce millets as a nutritious food for consumers and to reduce the malnutrition and its related health problems. This study focused on adapting proper machinery and techniques for reducing some anti-nutrients which decrease the digestibility, acceptability and bioavailability of millets, nourishing the health. To promote millet utilization, Household food processing strategies are used for enhancing the nutritional quality for future perspective. Many research organizations of Central and state paying a lot of attention in developing the Millet based machines and process technologies owing to the demand of preference for healthy foods and to encourage Self Help Groups

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