



## Value added products from maize and millets

**T**he food processing sector is a highly fragmented industry. Broadly the food industry is classified into various sub-segments viz. : fruits and vegetables, milk and dairy products, juice and beverages, meat and poultry, marine products, grain processing, packaged or convenience food, packaged drinks and nutraceutical products.



### Maize and millets

A large number of entrepreneurs in food industry are small in terms of their production and operations, and are largely concentrated in the unorganized segment. Food processing units can be one of the priority sectors when it comes to GDP Issues.

### R&D supports for food processing enterprises

Government of India has created CSIR, DRDO, and ICAR State Agriculture Universities across the nation with its own R&D facility to cater to the new food process techniques/technologies along with training of required manpower for the food processing industries.

### Government assistance

The Government has introduced several schemes to provide financial assistance for setting up and modernizing of food processing units, creation of infrastructure, support for research and development and human resource development in addition to other promotional measures to encourage the growth of the processed food sector.

All the developed and fermented food mixtures when rehydrated were found to be organoleptically acceptable. The food has high starch and protein digestibility (in vitro)

78 to 96% and 47-55%, respectively), significant lowering of serum cholesterol and LDL – cholesterol level and reduced gastrointestinal side effects when used with ampicilline.

### Value added health food products from millets

Various value added products were developed and standardized using pearl millet, finger millet, barnyard millet and sorghum. Some health foods were also developed for diabetics utilizing pearl millet. The details of food products developed are summarized below:



Pearl millet

1. **Formulation of diabetic products/mixes** – Pearl millet being a good source of dietary fibre and phyto-chemicals can be used for preparation of diabetic foods.

The process developed is a preparation of diabetic formulations with fenugreek and Bengal gram seed coat in pearl millet base. Before use the pearl millet flour is processed and fenugreeks were germinated and oven dried, all the components were ground and necessary components of sweetening and salt in case of salt biscuits were added to produce the various products given below.

- Preparation of *Chapatti* mix, *dhokla* mix, *idli* mix- *chapatti* mix and pasta were prepared using different proportions of bleached or unbleached pearl millet with Bengal gram seed coat.
  - Pasta - prepared using different proportions of bleached or unbleached pearl millet with Bengal gram seed coat.
2. **Development of supplementary foods:** *Nankhatai*, *namkeen matar* and popped *ladoo*. Milk powder/soya bean/chickpea flour etc. were also added to improve its nutritive value of the supplements.
  3. **Development of baked products:** Cake, biscuits, Soup sticks, Rusk, Salt biscuits. Biscuits were prepared using different proportions of bleached or unbleached pearl millet with Bengal gram seed coat.

All the products developed from various proportions of millets were found to be acceptable and nutritious.

The products are not at all available in the market. Traditional products based on wheat flour/refined flour are available.

Costs of pearl millet based products are almost 50% of traditional products and are superior in nutrients.

## Value added products of pearl millet

The Department of Food and Nutrition has also developed as many as 33 value added products such as *nankhatai*, cake, sweet biscuits, sweet salty biscuits, pasta, fryums, weaning mixture, *gatta* curry, *idli*, *burphi*, sprouted *chat*, *halwa*, *ladoo* etc. of the maize varieties/hybrids and also several high value products of pearl millet which can be popularized as these products are highly nutritive.

## Processing of pearl millet for value addition

Minor millets are grown over seven million hectares of land in India, producing five million tons of grains. The richness of millet varieties in the dry lands of southern India is similar to the diversity seen in Africa. Finger millet alone accounts for 2.6 million hectares, producing 3 million tons and providing staple food for people in Karnataka, Tamil Nadu, Andhra Pradesh, Orissa, Maharashtra and Bihar. Millets in Indian diets are classified as coarse cereals with small grains having 2.1 – 7.1 gm/1000 grain weight. Well- filled grains have 1.4 – 5.1 ml/1000 grain volume. They have spherical to oval shape with colored seed coats. Millet is relished mostly by the rural population in India for its nutritional value, being a rich source of carbohydrates and minerals, such as calcium, phosphorous and iron. The major millet varieties in India are: (a) sorghum (*Sorghum bicolor*); and (b) pearl millet (*Pennisetum typhoides*).

Millets are rich source of nutrients. There are certain constraints like coarse skin, undesirable colour pigment presence of anti nutrients, poor keeping quality, etc. which hinder the utilisation of these millets. Various processing methods have been developed and standardised to overcome these constraints and improve the nutritive value of millets. These processing help to improve utilisation of millets for product development.

The processing also helps in increasing the shelf life of the processed pearl millets flour to 2-3 months from 5-8 days. The shelf life study indicates that the fat acidity, free fatty acids and lipase activity increased by almost four folds at the end of storage period in case of unprocessed pearl millet flour whereas the increase in these parameters was significantly lower in processed flour. During storage it was also noticed that acceptability of colour and appearance in raw pearl millet flour was much lower as compared to processed pearl millet flour.

## Steps adopted in food processing units

For any food processing unit the first and foremost requirement is raw material processing by sun drying, screening for cleaning of foreign material like sand particles, agricultural waste if any, followed by mechanical processing including dehusking, grinding, milling - converting into flour or fine particles.

Later it needs to be converted into intermediate stage to bring the final products. Conversion is carried by addition of other ingredients, flavors, milk; water. The mechanized system like mixers, kneaders, baking, cooking can also be employed. Finished products needs to be tested for its quality and other parameters followed by packing it in containers either in ready to sell form like pouches, pet jars and others or it can be preserved for final packing as and when required.

## Key goal for food units

- Taste and Quality final product
- Shelf life of the product
- Hygienic working condition during production
- Cost effective and affordability

## Precautions for food processing units

- No adulteration
- Less damage during packaging and transposition
- Meeting of food safety standard as per government norms

## Techno economics for setting up of food processing units

<b>Suggested Capacity</b>	500 kg batch size for 300 working days in a year
<b>Total land required</b>	700 sq. mt
<b>Covered area</b>	500 Sq. mt
<b>Manpower required</b>	15 Nos.
<b>Major raw material</b>	Maize and pearl millets (Pearl millet, finger millet, barnyard millet and sorghum)
<b>Products</b>	Health food products from millets, and other foods (high fibre –low fat biscuits, organic herbal biscuits and others)
<b>Utility</b>	Electric power, water

## Basic List of equipments required in Food processing Units:

S. No	Name of equipments	Capacity	Quantity
1	Flour Mill	50 kg/hr	1
2	Auto seiver	50 kg/hr	1
3	Flour blenders	100 kg/hr	1
4	Weighing scales	Heavy-1 Light-1 Small 1	1
5	Sealers( vacuum)	-----	1
6	Storage Bin (raw, Intermediate products)	500,100,50 ,25kg	40

<b>Particulars</b>	<b>Rs. In Lakhs</b>
Land and Building	10.00
Plant and Machinery	15.00
Miscellaneous Fixed Assets	01.00
Pre-Operative Expenses	01.00
Contingency Provision	01.00
Margin Money for Working Capital	02.00
Total	30.00

### Source of technology: CFTRI



**H.K. Phanikumar**

Consultant Business development

National Research Development Corporation

(An Enterprise of DSIR, Min. of S&T, Government of India)

Regional Office: # 107, 8th Main (Near 19th Cross), Malleswaram,

Bengaluru 560 055, Phone: +91-80-23341255, Fax: +91-80-23347555

E mail: [hkpumar@nrdc.in](mailto:hkpumar@nrdc.in), Website: <http://www.nrdcindia.com>