



# A Glance at Millet Processing Technologies of ICAR-CIAE



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December 2022

## Millet Processing Machinery



### CIAE Millet mill (Model I)

- Mode of operation: continuous
- Capacity: 100 kg/h
- Power requirement: 1 hp (1440 rpm) Single  $\phi$  motor
- Floor area: 860 mm x 842 mm
- Weight: 112 kg excluding motor
- Dehulling efficiency: 90-95%
- Suitable for foxtail, little, kodo, proso and barnyard millets



### CIAE Millet mill (Model II)

- Mode of operation: continuous
- Capacity: 100 kg/h
- Power requirement: 1 hp (960 rpm) + 1 hp (2880 rpm) Single  $\phi$  motor
- Floor area: 1118 mm x 900 mm
- Weight: 150 kg excluding motor
- Dehulling efficiency: 95%
- suitable for foxtail, little, kodo, proso and barnyard millets



### CIAE millet popping machine (Model I)

- Mode of operation: continuous
- Power requirement: 5 kW (Three phase)
- Capacity: 1.4-2 kg/h
- Popping efficiency: 60-70 % popping recovery for Sorghum & Amaranthus.
- The overall dimension : 1000 mm x 970 mm x 580 mm
- Total weight: 80 kg
- suitable for popping of sorghum, amaranthus, finger millet, kodomillet, and other small grains including paddy, rice, and corn



### Millet Processing Line (25 kg/day)

This processing line can produce fermented millets and millet flakes with a set of machine, such as fermentor cum steaming vessel, pneumatic conveyor cum dryer, flaking machine

#### Fermentor cum steaming vessel

- Mode of operation: Batch type
- Capacity: 0.150 m<sup>3</sup>
- Working volume: 0.105 m<sup>3</sup>
- Power requirement: 1 hp (agitator) + mini boiler
- Temperature controller: PID controller
- Weight : 170 kg
- Suitable for sorghum, pearl millet, kodo millet, other and grains, liquid & pulps

### Pneumatic Dryer cum Conveyor

- Mode of operation: continuous
- Power requirement: 3 hp blower
- Capacity: 100 kg/h
- Suitable for sorghum, pearl millet, wheat

### Flaking Machine with Flakes Conveyor

- Mode of operation: Continuous
- Capacity: 100 kg/h
- Power requirement: 2 hp Single  $\phi$  motor
- Moisture of feed: 40%
- Flaking efficiency :92%
- Suitable for sorghum, pearl millet, corn, wheat and other cereals

# Value added products from Millets

<p><b>Fermented Sorghum Flour</b></p> 	<p><b>Ingredients:</b> Whole grain sorghum</p> <p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Preservative free</li> <li>• Lower tannin</li> <li>• Better Taste</li> <li>• lower phytic acid</li> </ul>	<ul style="list-style-type: none"> <li>• Higher shelf life ( about 45 d)</li> <li>• Higher vitamin B complex</li> <li>• Better amino acid profile</li> </ul>
<p><b>Fermented Pearl Millet Flour</b></p> 	<p><b>Ingredients:</b> Whole grain pearl millet</p> <p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Whole grain flour</li> <li>• Preservative free</li> <li>• Higher shelf life (&lt;21 d)</li> </ul>	<ul style="list-style-type: none"> <li>• Lower tannin</li> <li>• Lower phytic acid</li> <li>• Higher vitamin B complex</li> <li>• Better amino acid profile</li> <li>• Better taste</li> </ul>
<p><b>Masala Sorghum mix</b></p> 	<p><b>Ingredients:</b></p> <ul style="list-style-type: none"> <li>• Fermented Sorghum flakes</li> <li>• Defatted Soybean flour</li> <li>• dairy ingredients</li> <li>• Dried vegetables</li> <li>• Spices &amp; condiments</li> </ul>	<p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Gluten free</li> <li>• High fibre</li> <li>• Adequate shelf life (3 month)</li> <li>• Preservative free</li> <li>• Better taste</li> <li>• Better nutrition</li> </ul>
<p><b>Sorghum Upma mix</b></p> 	<p><b>Ingredients:</b></p> <ul style="list-style-type: none"> <li>• Fermented sorghum grits</li> <li>• Pulses</li> <li>• Dried vegetables</li> <li>• Spices &amp; condiments</li> </ul>	<p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Lower tannin &amp; phytic acid</li> <li>• Better taste</li> <li>• Adequate shelf life (3 months)</li> <li>• Preservative free</li> </ul>
<p><b>Kodo Kheer mix</b></p> 	<p><b>Ingredients:</b></p> <ul style="list-style-type: none"> <li>• Fermented kodo rice</li> <li>• dairy ingredients</li> <li>• Nuts</li> <li>• sweeteners</li> </ul>	<p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Better availability of nutrients</li> <li>• Adequate shelf life (&lt; 6 months)</li> <li>• Preservative free</li> </ul>
<p><b>Kodo Halwa mix</b></p> 	<p><b>Ingredients:</b></p> <ul style="list-style-type: none"> <li>• Fermented kodo rice</li> <li>• Dairy ingredients</li> <li>• Nuts</li> <li>• Fat</li> <li>• Sweeteners</li> </ul>	<p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Better availability of nutrients</li> <li>• Adequate shelf life (&lt; 6 months)</li> <li>• Preservative free</li> </ul>
<p><b>Eggless Gluten-free Cake</b></p> 	<p><b>Ingredients:</b></p> <ul style="list-style-type: none"> <li>• Cereal</li> <li>• Finger-millets</li> <li>• Pulses</li> <li>• Fruit</li> <li>• Dairy ingredients</li> </ul>	<p><b>Salient features:</b></p> <ul style="list-style-type: none"> <li>• Egg-less</li> <li>• Gluten free</li> <li>• Good source of protein, minerals, phenolics &amp; antioxidants.</li> <li>• Preservative free</li> </ul>

**Multi-nutrient bars****Ingredients:**

- Rice
- Sorghum
- Soybean
- Peanuts
- Jaggery

**Salient features:**

- High in energy and proteins
- Good source of minerals, phenolics & antioxidants.
- Easy to store and consume
- Preservative free

**Multi-grain Biscuits****Ingredients:**

- Cereals
- sorghum/finger-millet
- Pulses
- Oilseeds
- dairy ingredients
- tropical fruits

**Salient features:**

- Rich in proteins, fibre, minerals, anti-oxidants, phenolics
- Adequate shelf-life : 3 months
- Preservative free
- Ideal as any-time snack

**Multi Nutrient Ladoo****Ingredients:**

- Sprouted legumes
- Malted finger-millet
- Dairy ingredients
- Fruit
- Oil
- Jaggery

**Salient features:**

- High in energy, protein , fat and iron
- Good sources of anti-oxidants, phenolics and flavonoids
- Easy to store and consume.
- Preservative free

**Baked Multi -Grain Chips****Ingredients:**

- Corn
- Wheat
- Rice
- Sorghum
- Soybean
- Green gram
- Skim milk powder

**Salient features:**

- Rich in proteins, fibre, minerals, anti-oxidants, phenolics & flavonoids
- Preservative free
- Adequate shelf-life (3 months)

**Multi-nutrient Extruded Snacks****Ingredients:**

- Corn
- Rice
- germinated pulses
- malted finger-millet
- Milk powder
- Spinach

**Salient features:**

- High in energy & iron
- Rich in anti-oxidants, phenolics flavonoids
- Easy to store & consume
- Preservative free

**Millet - legume Beverage****Ingredients:**

- Finger-mille
- sprouted green gram
- sprouted soybean
- Coconut
- milk powder
- jaggery / buttermilk

**Salient features:**

- good source of healthy fats and protein
- Higher antioxidants
- Rich in minerals & vitamins
- Adequate ate shelf life at 4°C(4 months)

**Multi-nutrient Instant Porridge****Ingredients:**

- Sorghum
- Finger-millet
- Pulses
- Oilseeds
- Dairy ingredient
- Protein isolates
- Fruit

**Salient features:**

- High in dietary fibre
- Good source of flavonoids, phenolics & antioxidants
- 4xprotein & 2x more minerals than wheat porridge.
- Preservative free