

PROCESSING OF BLACK RICE



AATMANIRBHAR BHARAT

**PM Formalisation of Micro Food Processing
Enterprises Scheme (PM FME Scheme)**

INTRODUCTION

- Rice is a staple food across the world.
- Several types of rice exists around the world like white, red, black, purple, brown, etc.
- Different name exists due to physical appearance of the paddy and the different colour exists due to presence of different pigments in different rice varieties.
- Black rice is also called forbidden rice or emperors rice.
- Because once in a time a Chinese emperor forbidden this rice in his state and stored all for self-health and longevity.

INTRODUCTION

- ❖ Black rice is of short duration, photo insensitive, non-responsive and low productive towards the fertilizer doses.
- ❖ Black rice contains a high amount of protein and fiber over all the other types of rice.
- ❖ It contains 18 different amino acids, copper, carotene and several other essential vitamins.
- ❖ It is often considered a superfood because of its high nutritional content, in addition to the fact that it's naturally high in anthocyanins, which are the antioxidant pigments that give the rice its unique coloring.
- ❖ This rice variety is rich in
 - ❖ Antioxidants
 - ❖ Protects heart health
 - ❖ Able to detoxify liver
 - ❖ Prevent diabetes
 - ❖ Helps to fight cancer
 - ❖ Regulates blood pressure

INTRODUCTION

- ❖ Its purplish-black color is a result of its high concentration of anthocyanin.
- ❖ Japanese researchers found that a change in a gene that controls anthocyanin rearranged to create black rice; this mutation occurred in a subspecies of rice.
- ❖ The grain is cultivated in Southeast Asian countries such as India, Indonesia, Thailand, and China.
- ❖ Black rice cultivation has agronomic qualities like stable grain yield in marginal lands, stress tolerance, and pest and disease resistance.

Nutritional information of black rice over all the other types of rice (Serving size: 100 g)

Rice	Protein	Iron	Fiber
Polished White Rice	6.8 g	1.2g	0.6g
Brown Rice	7.9 g	2.2 g	2.8 g
Red rice	7.0 g	5.5 g	2.0 g
Black rice	8.5 g	3.5g	4.9 g

- **The unique characteristics of Katarni Rice is**

Soft and Non-sticky rice with good digestible qualities

Strongly aromatic cooked and uncooked rice.

Brown Husk with awl shaped apex.

Untainted appearance and delectable taste

Famous for palatability and beaten rice making qualities.

- Local varieties have yield potential ranging from 15 to 30 qtls/ha.
- The Katarni paddy is highly susceptible to various insect pests and diseases, like: (i) stem borer and (ii) bacterial blight.

PADDY TO RICE PROCESSING

- **Parboiling:** Parboiling is an important step before milling of paddy. It is a hydrothermal treatment which improve the head rice count and increase the yield of rice.



Advantages of parboiling

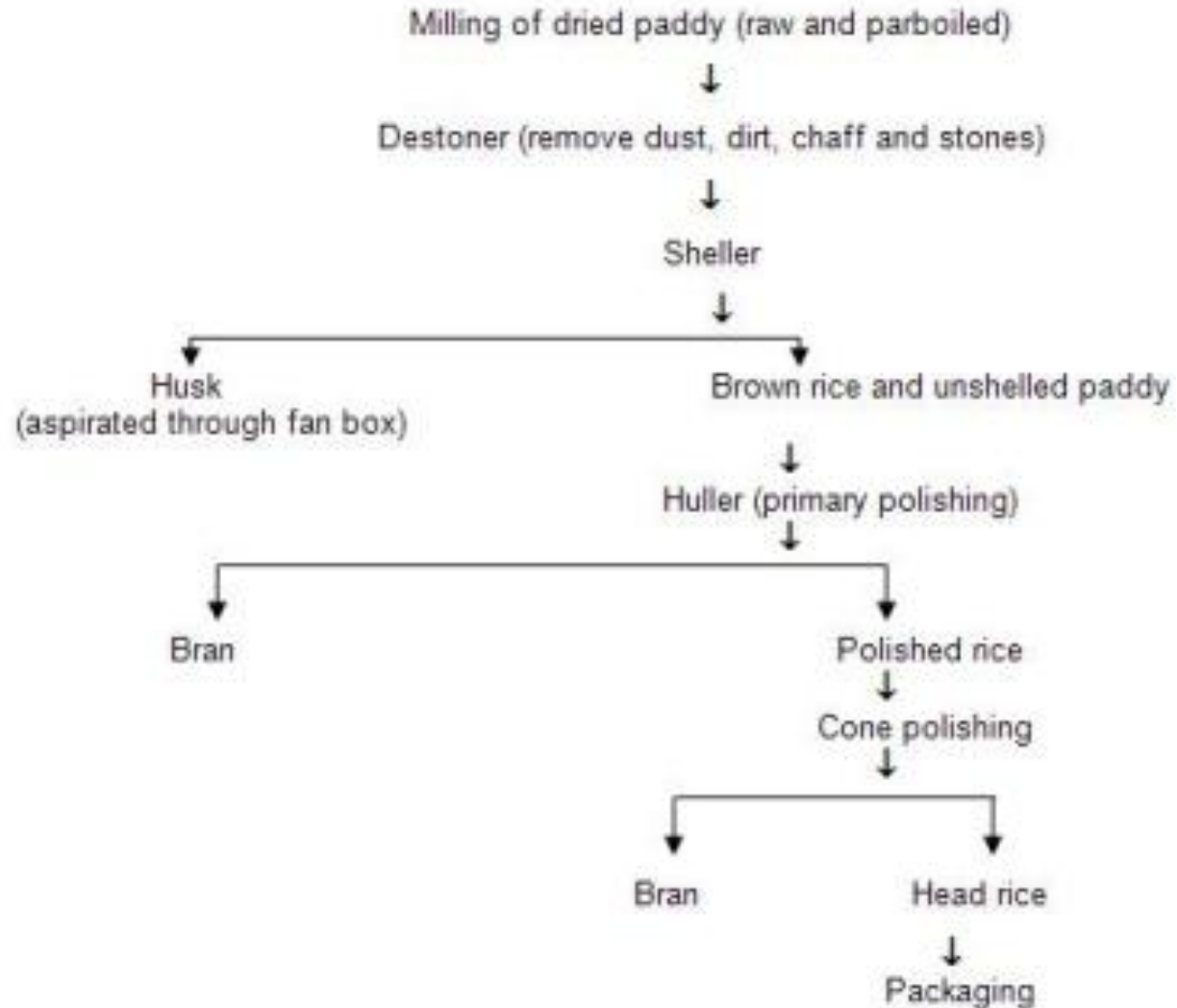
- Smooth surface finish and increase the head rice count.
- Loss of soil during cooking is also less.
- Cooking quality of rice increased
- More nutrient retention in rice.

Disadvantages of parboiling

- It develops a relatively darker colour compared to raw rice.
- The traditional parboiled process produces an undesirable smell.
- Parboiled rice takes more time to cook to the same degree of softness than raw rice.
- Because of long soaking in traditional process, mycotoxins may develop in parboiled rice and cause health hazards.
- Parboiling process requires an additional investment of capital.

MILLING OF PADDY

After parboiling, paddy is subjected to milling to make rice. The processing steps of milling is given below.



POHA PROCESSING

- Rice flakes is also popularly known as "Poha" are prepared from paddy.
- It is often eaten for breakfast or brunch and is quite light and nutritious.
- It is mainly used in the Western region i.e., in Maharashtra and Gujarat and some parts of the Eastern & Northern Region.
- It can be fried with spices and chilly to make hot and tasty food item or milk / curd is mixed with it and then eaten.
- Most people take it after frying whereas some takes it with milk; the dish is easy to cook & nutritious and contains carbohydrates & proteins.
- The flakes are very easy to cook and can make a meal in minutes.



PROCESSING METHODS OF POHA

- Raw paddy was soaked in the water for 24 to 30 hours at a room temperature to increase its moisture content up to 30 to 32 %.
- This was followed by complete removal of water from the soaking tank and the soaked paddy was conveyed through a 5 kg cloth carry bag into the hopper of the paddy roaster operated at the highest temperature about 172 - 175°C for a short period of time about 35 to 40 seconds in fine sand.
- The process results in drying of husk with its internal moisture content in the range of 17 to 19 % yielding roaster paddy that was immediately conveyed to the rice flaked machine operating at 200 rpm by 3 HP electric motor.

PROCESS FLOW CHART FOR PREPARATION OF FLAKED RICE





**Roaster machine for flaking
process**

SIEVING AND CONDITIONING

- The roasted paddy is fed to the flakers, whereas, in medium and large-scale system
- It is moistened and conditioned to obtain different types of flakes, such as thick (~1 mm), medium (~0.6 mm), thin (0.55-0.3 mm) and very thin (<0.3 mm).
- For the largest processors that operate the continuous type of roasters, the sand roasted paddy is sieved in order to remove the adhering sand and impurities.



Roller machine for making thin flaked rice

FLAKING

- Edge runners are batch type flaking machines with the capacity to flake 50, 100, and 150 Kg/hr of paddy. In edge runners, the paddy is pressed in between the body of the edge runner and flaking roller.
- The husk and bran come out through the perforated mesh at the base of the edge runner.
- The remaining husk parts and bran that continue along with the flaked rice are cleaned by manual winnowing or by using a sieving shaker.
- After completion of flaking, the flaked rice is scooped out by hand and collected in plastic buckets.

Edge runner machine



SIEVING AND PACKING

- The flaked rice is sieved in a sieve shaker in order to separate small, broken, powdered material and lumps.
- The thick flaked rice requires drying (shade drying) in order to reduce the moisture content before packing. After this, the flaked rice is packed directly into polyethylene bags.



- Different packing systems are in practice, depending on the requirements of the local market and the quality and type of flaked rice.
- The shelf life of the thick type of flaked rice is less than the medium and thin type flaked rice as it contains more moisture and undergoes less polish than the other grades.

FINAL PRODUCT

- Generally, 65-70% of yield is obtained in the field depending on variety, quality of paddy, processing, condition and the type of flaked rice processed.
- Different states are using different paddy variety such as Mahamaya in Chhattisgarh and Maharashtra and Kranti in Madhya Pradesh for flaked rice prepared.



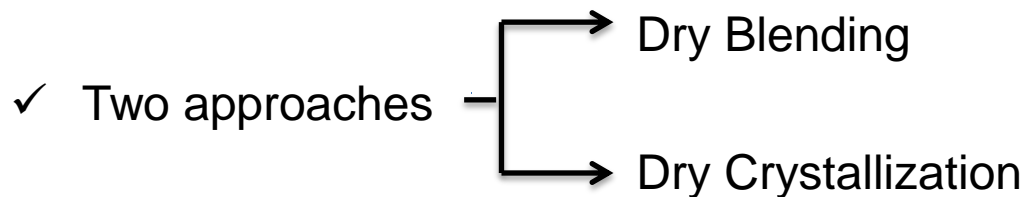
INSTANT DRY MIXES

- The preservation of food products in its dry form is an old age technique; the low moisture content in the dry product not only lowers the shipping cost and storage space requirement, but also produces a shelf-stable valuable product that can be stored at ambient temperature for extended periods.
- One of the major constraints which restrict the large-scale organized production and marketing of traditional Indian foods are the limited shelf life of the product under both ambient and refrigerated storage.
- In addition to the substantial value-addition and product diversification achieved by this line of product development, instant dry mixes are also designed to provide convenience to the consumers during its preparation, reduce wastage from spoilage, save consumers time, and reduce financial costs using economics of scale.

PALADA PAYASAM MIX

- ✓ ***Palada Payasam*** is a milk based sweet delicacy popular in Kerala.
- ✓ Prepared with ada flakes cooked in milk and sugar till the product achieves its desirable characteristics.
- ✓ Ada is traditionally prepared from steamed rice batter wrapped in banana leaves; the flakes are obtained by cutting the ada to desired size.
- ✓ The product is characterized by its light brown color, cooked flavor, dispersed ada flakes in milk which is chewable when cooked.
- ✓ Unnikrishnan *et al.* (2003) developed a method for *palada payasam* dry mix. In this method, *ada* flakes (prepared using rice flour) were soaked for about an hour in hot water followed by decantation of the water.

- Preparation of ada- time consuming and tedious.
- Convenience packs of dried ada flakes are now commercially available and is very popular, this has made the preparation of payasam less time consuming.
- However, the *Payasam* prepared from this product often lacks the characteristic color, flavor and texture.
- Need for convenience product in this category.
- Several attempts have been made for commercially to develop instant mix for the products.



- The dry mix of the *Palada* developed by Dry Crystallization process, - used to prepare *Payasam* having the traditional sensory characteristics with long shelf life

TRADITIONAL METHOD OF ADA PREPARATION



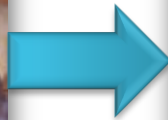
Soaking rice



Grinding



Preparation of batter



Spreading batter on banana leaf



Cooking in hot water



Cutting in to small flakes



FLOW CHART FOR PREPARATION OF DRY-MIX

Boiling of Ada flakes in water with occasional stirring

Washing the flakes 2-3 times with cold water

Heating in steam kettle to a pasty mass

Addition of sugar and milk

Heating with constant stirring and scraping

Addition of sugar syrup

Heating and mixing

RICE KHEEL

- ✓ Kheel, also known as lava or lai, is easily found in the kitchen of every household in India.
- ✓ It has many tradition values and being used in religious functions (Lohri, Makar Sankranti, Vivah, Lakshmi Puja, Diwali) is also very beneficial in terms of health.
- ✓ It is considered healthy breakfast due to its digestibility and food properties. By including it in your diet, it can save you from many diseases. Some of the important health benefits of Kheel is –
 - ❖ Kheel has high fiber content which will prove beneficial in reducing your obesity.
 - ❖ Apart from this, the skin will also cure your constipation problem.
 - ❖ Beneficial in Hematitis and diarrhea.
 - ❖ Give instant energy to our body.
 - ❖ Improve digenstion

RICE KHEEL

- ✓ Kheel is manufactured from paddy.
- ✓ Paddy is soaked in water for 6-8 h at room temperature followed by draining of water.
- ✓ The paddy is then subjected to roasting in sand. The paddy expands and it becomes Kheel.
- ✓ The Kheel is then sieve to remove extra sand and paddy.
- ✓ The Kheel is then packed in suitable packaging material for further marketing and distribution.



Rice Kheel

RICE FLOUR

- ✓ Rice flour can be used in making rice-based food products such as biscuits, cakes, noodles and other rice-based snacks.
- ✓ Rice flour is a unique over other flour because It eases in digestion
- ✓ Make as carrier of food colour and preservatives
- ✓ Bland taste
- ✓ Hypoallergenic properties
- ✓ Low in fat helps in absorbing fat
- ✓ Low in protein and helps in making essential baked products
- ✓ Can be made from broken rice makes it more cost effective
- ✓ High value lysine than similar cereal flours and therefore could be easily fortified with high lysine food than the other cereals



METHOD OF RICE FLOUR PRODUCTION

- ✓ Its production process is different from wheat, maize and millet flour production process.
- ✓ Rice flour is made by grinding broken milled rice and there are generally three methods adopted for flour preparation of rice. 1. Wet grinding 2. Semidry grinding 3. Dry grinding

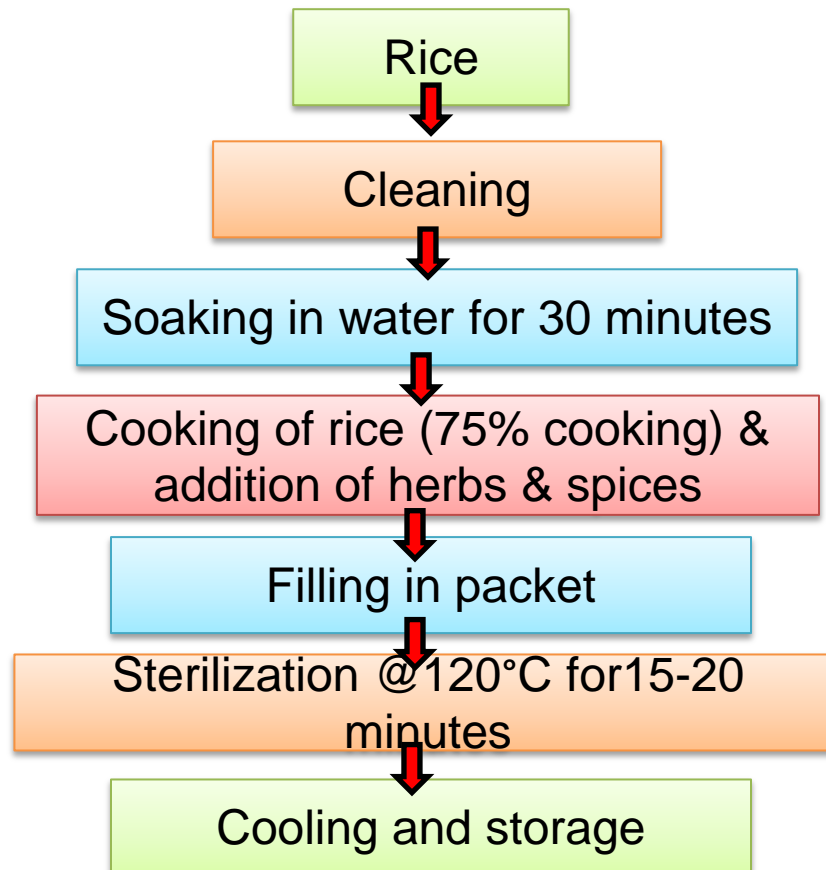
1. Wet grinding: It is a traditional method to prepare rice flour. In this process, firstly rice is soaked in water followed by grinding, filtering, drying, sieving and packaging.

2. Dry grinding: In this method rice is directly grind to produce fine powder. It is cost effective, required less energy but need machine having good grinding capacity.

3. Semidry grinding: In this process, rice is soaked in water and then excess water is removed with the help of dryer before grinding. The obtained flour having good physico-chemical characteristics than other grinding methods.

READY TO EAT (RTE) RICE PROCESSING

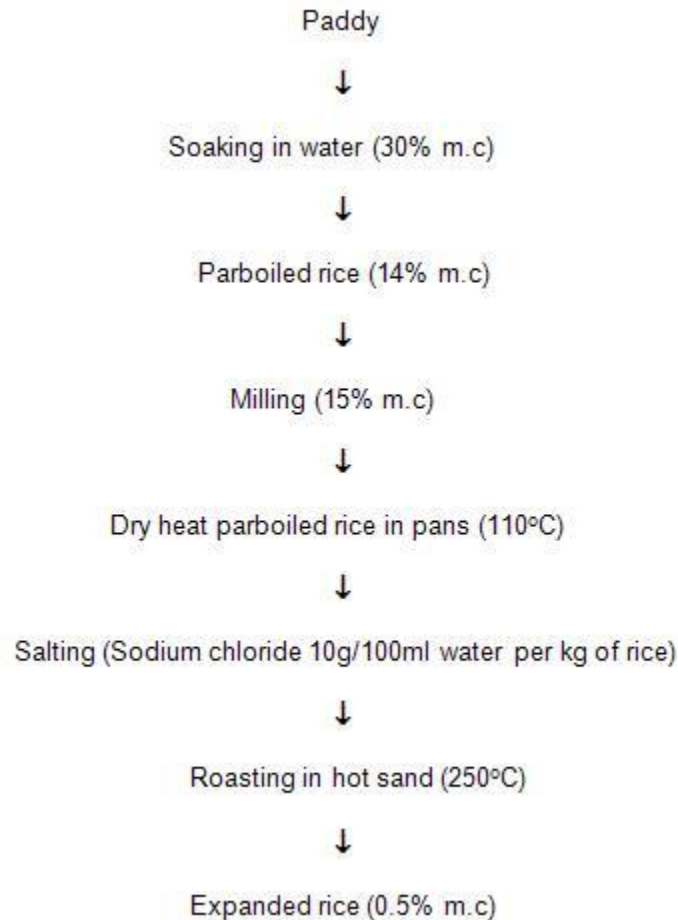
- ✓ Ready to eat foods are the precooked food which can be consume directly.
- ✓ Before RTE preparation food products are pre-cleaned, precooked and retort in flexible package or canned.
- ✓ The advantages of RTE are time saving, convenient and value for money.



**Process flow
diagram of RTE rice
processing**

PARCHED RICE

- ✓ It is also called *Murmure*, *muri*, *pori* in India and is widely consumed with different preparation.



Processing steps of Parched rice



For More details Contact:

National Institute of Food Technology and
Entrepreneurship and Management
Ministry of Food Processing Industries
Plot No. 97, Sector-56, HSIIDC, Industrial
Estate, Kundli, Sonipat, Haryana-131028

Website: <http://www.niftem.ac.in>

Email: pmfmecell@niftem.ac.in

Call: 0130-2281089