



Unit IV - Topic 1

Paddy Processing

Paddy processing, also known as rice processing, involves a series of operations to transform harvested paddy rice into marketable rice for consumption. This process includes cleaning, hulling, milling, polishing, grading, sorting, and packaging the rice. Here's an overview of the typical steps involved in paddy processing:

1. Cleaning:

- Remove impurities like stones, sticks, and other foreign materials from the harvested paddy using cleaning equipment such as sieves and cleaners.

2. Hulling:

- Hulling involves removing the outer husk or hull from the paddy to produce brown rice. This is typically done using a huller or dehusking machine.

3. Milling:

- Milling is the process of removing the outer layers (the husk, bran, and germ) from brown rice to obtain white rice. This is accomplished through a milling machine that separates the layers based on size, shape, and density.

4. Polishing:

- After milling, the rice may undergo a polishing process to remove any remaining bran particles and improve its appearance and marketability.

5. Grading and Sorting:

- Rice is graded and sorted based on size, shape, and quality using various grading machines. This helps segregate rice into different quality grades for packaging and distribution.

6. Color Sorting:

- Advanced color-sorting machines are used to remove any discolored or defective grains, ensuring a uniform and high-quality final product.

7. Packaging:

- The final, processed rice is weighed and packaged into appropriate packaging materials (e.g., bags, sacks) for distribution to wholesalers, retailers, or consumers.



8. Storage:

- Packaged rice is stored in appropriate storage facilities to maintain its quality and freshness until it is ready for distribution.

In addition to these primary steps, there are further optional processing steps such as parboiling (soaking paddy before milling) and fortification (adding essential nutrients to the rice) depending on the desired end product and local preferences.

Efficient paddy processing is crucial to producing high-quality rice products that meet market demands. The modern rice processing industry often utilizes automated and computer-controlled equipment to enhance efficiency, quality, and safety in the entire processing chain.

Parboiling of Paddy:

Parboiling is a process used in rice processing where paddy rice is soaked, steamed, and dried before milling. The term "parboil" comes from partially boiling the rice in its husk. This process helps improve the nutritional value, storage quality, and milling yield of the rice. Here's a detailed explanation of the parboiling process:

1. Soaking:

- The process begins with soaking the harvested paddy rice in water. The soaking duration may vary, but it typically lasts for several hours (e.g., 4-6 hours) or even overnight, allowing the water to penetrate the grains.

2. Steaming:

- After soaking, the paddy rice is steamed to partially cook the grains. The soaked paddy is placed in a steaming chamber or autoclave, where steam is passed through the grains. This step ensures that the outer layers of the rice grains are gelatinized, making it easier to remove the husk during milling.

3. Drying:

- Following steaming, the parboiled rice is dried to reduce its moisture content. This can be done using dryers or in the sun on drying mats or floors. The drying process fixes the gelatinization, ensuring that the rice will not revert to its original state during subsequent storage.



4. Cooling:

- After drying, the rice is allowed to cool to room temperature. This is an essential step before milling, as it prevents the grains from sticking together during the milling process.

5. Milling:

- The cooled, parboiled rice is then milled to remove the husk, bran, and germ layers, resulting in parboiled rice (also known as converted rice). Milling can involve further polishing and grading to obtain the final product.

Parboiling offers several benefits:

- **Nutritional Improvement:** Parboiling helps in retaining essential nutrients, particularly thiamine and other vitamins, in the rice.
- **Reduced Breakage:** Parboiling hardens the rice grain, making it less prone to breakage during milling.
- **Enhanced Storage Stability:** Parboiled rice has improved storage properties, including reduced insect infestation and a longer shelf life compared to raw rice.
- **Faster Cooking:** Parboiled rice cooks faster compared to raw rice, as the steaming process precooks the rice to some extent.

Parboiling is a common practice in many rice-producing regions and is crucial for improving the quality and nutritional value of the final rice product.

Methods of Parboiling Paddy:

Parboiling, also known as parboil or "pre-cooking," is a process used to partially cook paddy rice before milling. The process involves soaking, steaming, and drying the paddy to improve the nutritional value, extend shelf life, and enhance the milling efficiency. Below are the methods, merits, and demerits of parboiling paddy:

1. Soaking:

- Paddy rice is soaked in water to allow the moisture to penetrate the grains thoroughly. This step helps in loosening the outer husk, making it easier to remove during milling.

2. Steaming:

- The soaked paddy is then subjected to a steam treatment, where it's partially cooked under



controlled steam pressure and temperature. Steam penetrates the grain, gelatinizing the starches in the endosperm.

3. Drying:

- After steaming, the partially cooked paddy is dried to reduce its moisture content to a level suitable for milling and storage. This step helps in stabilizing the grains and preventing mold growth.

Merits of Parboiling Paddy:

1. Nutritional Enhancement:

- Parboiling helps improve the nutritional value of rice by enhancing the bioavailability of nutrients, especially thiamine (vitamin B1), and preserving essential vitamins and minerals present in the outer layers of the grain.

2. Milling Efficiency:

- Parboiling makes the removal of the husk easier during the milling process, leading to higher milling yields and reduced broken rice, resulting in a higher head rice recovery.

3. Improved Shelf Life:

- Parboiled rice has an extended shelf life compared to raw rice, as the process helps reduce insect infestation and prevents rancidity due to the stabilization of lipids.

4. Reduced Cooking Time:

- Parboiled rice cooks faster compared to raw rice, making it more convenient for consumers and reducing fuel consumption during cooking.

Demerits of Parboiling Paddy:

1. Energy Intensive:

- The parboiling process involves the use of steam, which requires a significant amount of energy. This can be a drawback in regions where energy is scarce or expensive.

2. Initial Investment:

- Setting up a parboiling unit requires a significant initial investment in equipment and facilities, which can be a challenge for small-scale farmers or processors.

3. Possible Nutrient Loss:

- While parboiling can enhance the nutritional value of rice, improper parboiling techniques or excessive soaking and drying can lead to nutrient loss, particularly water-soluble vitamins



like thiamine.

4. Environmental Impact:

- The energy-intensive nature of parboiling can have environmental implications, especially if the energy source is non-renewable and contributes to greenhouse gas emissions.

Properly conducted parboiling, with careful control of soaking, steaming, and drying processes, can result in a high-quality product that offers several advantages in terms of nutrition, milling efficiency, and shelf life. However, it's important to manage the process effectively to minimize potential drawbacks and ensure optimal outcomes.



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