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| SOP No: SOP-MILL-003 | SOP Description: Milling of Rice Samples Using the McGill #2 Laboratory Miller |
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SOP-MILL-003: Milling of Rice Samples Using the McGill #2 Laboratory Miller

Scope:

The milling process removes the outer layers (bran) from brown rice, resulting in a white or polished rice fraction, also known as milled rice.

Principle:

Rice mills remove the bran from brown rice by abrasion and/or friction. During the process, bran material is expelled from the mill, while the rice kernels are retained inside the milling chamber. Degree of milling is evaluated by visual inspection, from well milled to undermilled, according to USDA definition.

Equipment:

McGill #2 Rice Mill, RAPSCO, Brookshire, TX

Materials:

Brown rice
Vessel for collecting bran and milled rice fractions
Vacuum cleaner, metal spatulas, and wire brushes for cleaning mill

Procedure A – Milling the rice:

NOTE: Before milling sample rice, it is necessary to warm the mill by running “dummy” brown rice (obtained by dehulling “dummy” rough rice) through it two times, according to the instructions below. Once the mill is warmed up, it must be cleaned thoroughly between each sample.

1. Begin with a clean mill and work surface, free of powder, residues, and rice kernels.
2. Record initial weight of the brown rice sample.
3. Place a pan under the milling chamber to collect the bran.
4. Lock the milling chamber in place by lifting the lever to the upright position.
5. Position the flexible metal cover over the milling chamber.
 - a. The longer of the 2 sides must be placed on the right side of the chamber.
 - b. Leave an approximate 2 inch opening between the top curve of the cover and the chamber, in order to load rice.
6. Pour the brown rice sample into the milling chamber and lower the cover so that it is firm against the chamber.
7. Fasten the weight lever over the cover, ensuring that the 1.5-kg weight is placed approximately 15 cm away from the milling chamber on the flat end.
8. Set timer to 30 s.
9. Press the red button at center of timer to start the mill.
10. After the 30 s milling process is complete, remove the weight lever.

11. Discard the bran from the pan and replace the pan under the mill for collection of milled rice.
12. After the milling process is complete, but before the cover has been removed, use a vacuum cleaner to remove the powder that has collected in the grooves outside the milling chamber and on the surface of the cover.
13. Gently lift the cover off of the mill chamber, applying pressure to both sides in order to prevent a springing action that could throw rice kernels. Before removing the cover completely, use the back of a brush to knock the kernels that have stuck to the top surface into the pan.
14. Unlock the mill chamber and empty the remainder of the milled rice into the collection pan by turning the chamber upside-down. It may be necessary to place a hand at the right side of the chamber to direct the kernels into the pan. Use spatulas and/or brushes to scrape kernels off of the screen and all sides of the roller. Take care to retrieve all rice kernels from the mill chamber.
15. Place the milled rice into the aspirator for 3 minutes to remove any remaining dust or particulate matter. Refer to Procedure B for instruction.
16. Record final weight of the milled rice fraction.
17. Between samples and following the last sample of the day, it is critical to thoroughly clean the mill and cover. Refer to Procedure C for instruction.

Procedure B – Blowing the milled rice using the Grain Aspirator:

1. Place milled rice into the bottom portion of the grain blower.
2. Insert the longer top section of the tube into the bottom section.
3. Place the entire tube over the blowing port.
4. Set timer to blow for 3 minutes. Note that the aspiration continues for a few seconds, even after the timer has sounded.
5. When aspiration is complete, remove the entire tube (both sections) from the blowing port.
6. Remove the top section of the tube and empty contents of the bottom section into a bag or other vessel.

Procedure C – Cleaning the Mill:

1. Between samples, use wire brushes to scrub all accessible parts of the mill: cover, roller and chamber. These contact areas get oily from the lipids in the rice, and must be cleaned well in order to prevent hardening/caking of the residue.
2. Use dry bristle brushes to remove the loose powder and residue from these parts.
3. Use a vacuum cleaner to clean up all debris on and around the mill, as well as in the collection pans.

Reference:

Andrews, S. B., Siebenmorgen, T. J., and Mauromoustakos, A. 1992. Evaluation of the McGill #2 rice miller. Cereal Chem. 69:35 – 43.