International Standard 6646

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Rice — Determination of the yield of husked rice and milled rice

Riz — Détermination des rendements en riz décortiqué et en riz usiné

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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Rice — Determination of the yield of husked rice and milled rice

0 Introduction

The method described in this International Standard does not give precise information for evaluating the degree of milling of rice, such evaluations being performed visually by trained workers.

Several methods for the direct or indirect measurement of the degree of milling are currently being studied in various countries, but none have given complete satisfaction. This International Standard can only be used, therefore, for plant control purposes, until sufficient evidence has been obtained that good reproducibility of results can be obtained.

1 Scope and field of application

This International Standard specifies a laboratory method of shelling and milling rice to predict the industrial yields of husked rice from paddy and of milled rice from paddy or husked rice.

This method is mainly applicable for plant control purposes (see clause 0).

2 References

ISO 712, *Cereals and cereal products — Determination of moisture content (Routine method).*

ISO 950, *Cereals — Sampling (as grain).*

3 Definitions

For the purpose of this International Standard, the following definitions apply:

3.1 paddy: Rice still with its husk after threshing.

3.2 husked rice; cargo rice: Paddy from which just the husk has been removed.

3.3 milled rice: Glutinous or non-glutinous rice obtained after a milling operation which involves removing from the husked rice all or part of its pericarp and germ.

3.4 large broken rice: Grain fragments, the length of which is less than three-quarters, but greater than half the length of the whole grain.

3.5 medium broken rice: Grain fragments, the length of which is less than or equal to half, but greater than a quarter of the length of the whole grain.

3.6 small broken rice: Grain fragments, the length of which is less than or equal to a quarter of the length of the whole grain and greater than a limit which varies depending on the type of rice, but which does not pass through a metal sieve with 1,4 mm mesh.

3.7 fragments; chips: Grain fragments which pass through a metal sieve with 1,4 mm mesh.

4 Principle

4.1 Determination of the yield of husked rice

Removal of husks from paddy by mechanical means, and weighing of the husked rice obtained.

4.2 Determination of the yield of milled rice

Removal of husks and the pericarp from paddy or milling of husked rice and weighing of the whole milled rice, large broken rice, medium broken rice and small broken rice obtained.

5 Apparatus

Laboratory mechanical shelling (decorticating) and milling device: a laboratory apparatus for shelling and milling. These operations may be carried out in one or two stages by in-

dustrial methods using a regulated flow of air for separating the husks and the fine particles.

6 Sampling

Proceed as specified in ISO 950.

7 Procedure

7.1 Determination of the water content

Determine the moisture content in accordance with ISO 712, and ensure that it is 14 ± 1 % (m/m).

NOTE — If the moisture content exceeds 15 %, dry the sample in the laboratory atmosphere (for example at a temperature between 20 and 25 °C and a relative humidity between 40 and 70 %) or in an oven at 40 °C until the moisture content is 14 ± 1 %. To this end proceed as follows.

Spread out 300 ± 0,1 g of sample of known moisture content to a depth of 1 to 2 cm in a receptacle. Calculate by means of the following formula the loss in mass necessary to obtain a moisture content of 14 %.

$$m_p - \frac{100 - H_1}{100 - H_2} \times m_p$$

$$= m_p \times \frac{H_1 - H_2}{100 - H_2}$$

where

m_p is the mass of sample to be dried;

H_1 is the moisture content of the sample;

H_2 is the desired moisture content after drying (i.e. 14 %).

The loss in mass should be observed continuously. The drying process should be stopped when the observed loss in mass is within ± 3 g of the calculated value.

7.2 Determination of the yield of husked rice

Weigh, to the nearest 0,1 g, at least 100 g of the laboratory sample and transfer to the previously cleaned mechanical device. Separate the husked rice from the husks remaining in the machine and weigh the husked rice obtained.

7.3 Determination of the yield of milled rice

Weigh, to the nearest 0,1 g, at least 100 g of the laboratory sample into the mechanical device. Regulate the air flow to remove only the husks and fine particles. Set the clearance between the milling surfaces in accordance with the variety of rice, so that 100 g of husked rice can be milled in a specified time (1 to 2 min).

Treat the test portion in one or two operations according to the type of device used, until at least 90 % of the kernels have been completely milled and the remaining 10 % retain the pericarp on only half of the surface of the kernel.

When shelling and milling are completed, remove all the products obtained and weigh the whole milled rice, the large broken rice, medium broken rice and small broken rice separately.

8 Expression of results

8.1 Yield of husked rice

The yield of husked rice, y_A, expressed as a percentage by mass, is equal to

$$y_A = \frac{m_1}{m_0} \times 100$$

where

m_0 is the mass, in grams, of the test portion (of paddy);

m_1 is the mass, in grams, of husked rice obtained.

8.2 Yield of milled rice

The yield of milled rice, y_B, expressed as a percentage by mass, with respect to paddy or husked rice, is equal to

$$y_B = y_1 + y_2 + y_3 + y_4$$

where

y_1 is the yield, expressed as a percentage by mass, of whole milled rice, given by the equation

$$y_1 = \frac{m_2}{m_0} \times 100$$

where

m_0 is the mass, in grams, of the test portion (of paddy or husked rice);

m_2 is the mass, in grams, of whole milled rice;

y_2 is the yield, expressed as a percentage by mass, of large broken rice, given by the equation

$$y_2 = \frac{m_3}{m_0} \times 100$$

where

m_0 has the same meaning as previously;

m_3 is the mass, in grams, of large broken rice;

y_3 is the yield, expressed as a percentage by mass, of medium broken rice, given by the equation

$$y_3 = \frac{m_4}{m_0} \times 100$$

where

m_0 has the same meaning as previously;

m_4 is the mass, in grams, of medium broken rice;

y_4 is the yield, expressed as a percentage by mass, of small broken rice, given by the equation

$$y_4 = \frac{m_5}{m_0} \times 100$$

where

m_0 has the same meaning as previously;

m_5 is the mass, in grams, of small broken rice.

8.3 Repeatability

The difference between the results of two determinations, carried out simultaneously or in rapid succession by the same analyst, using the same apparatus, shall not exceed 1,0 % absolute of the husked or milled rice.

9 Test report

The test report shall show the method used and the results obtained, including the type of apparatus. It shall also mention any operating details not specified in this International Standard, or regarded as optional, and any circumstances that may have influenced the results (for example milling surfaces made of metal or stone, or enamelled surfaces).

The test report shall include all the information necessary for the complete identification of the sample.

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