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General Notice

MINISTRY OF AGRICULTURE, WATER AND RURAL DEVELOPMENT

No. 89 2000

GRADING STANDARDS FOR WHOLE AND DECORTICATED PEARL MILLET (MAHANGU) GRAINS

It is hereby made known for general information that the grading standards set out in the Schedule may be used as a guideline by prospective buyers and sellers of Mahangu and Mahangu products.

SCHEDULE

1. SCOPE

This standard applies to whole and decorticated pearl millet destined for human consumption which is obtained from *Pennisetum glaucum* or *Pennisetum americanum*, improved Namibian varieties Okashana I, Okashana II, Kangala, and farmers local varieties.

2. DESCRIPTION

2.1 Definition of Product

Pearl Millet grains shall be whole or decorticated and suitably dried if necessary. Pearl Millet (*Pennisetum glaucum* or *Pennisetum americanum*), commonly known as Mahangu, is a member of the grass family (*Peoaceae*) of plants. The seed, or caryopsis, is obovoid or tear-shaped with the proximal end pointed and the distal end rounded. The size varies

greatly with a thousand seed weight of between 4 and 8g. The colour also varies from white, yellowish, tan, and brown to blueish, but is mostly grey. Generally the caryopsis is not shiny and totally glabrous. The hilum, at the pointed/proximal end of the seed, is marked by a black dot.

2.1.1 Whole Grains

These are grains of pearl millet obtained as such after proper threshing with no mechanical treatment.

2.1.2 Decorticated Grains

These are grains of pearl millet from which outer parts, amounting to 20-22% of the weight of the whole grains have been removed in an appropriate manner using mechanical treatment (for example, simple abrasion).

2.2 Classes of Pearl Millet

For the purpose of these regulations and to allow buyers and sellers to clearly distinguish between the different properties of pearl millet kernels, pearl millet shall be classified in the following classes, namely:

- Improved varieties: Okashana I, Okashana II, and Kangala;
- Farmers local varieties (traditional "mahangu"); and
- Sample grade pearl millet.

2.3 Grades of Pearl Millet

Grades of pearl millet addresses the different quality levels of pearl millet offered for grading and will be expressed in higher prices for higher grade pearl millet and lower prices for pearl millet that contains a higher proportion of foreign matter, or defective kernels.

There are three categories of pearl millet as shown below:

Classes of pearl millet	Classes of pearl millet
Improved varieties: Okashana I, Okashana II, and Kangala	Grade 1, Grade 2 and Grade 3
Farmers local varieties (traditional "mahangu")	Grade 1, Grade 2 and Grade 3
Sample grade pearl millet	Pearl millet that does not meet any of the deviations allowed as listed

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Quality Factors - General

- 3.1.1 Pearl millet grains shall be safe and suitable for human consumption.
- 3.1.2 Pearl millet grains shall be free from abnormal flavours, odours, and living insects.
- 3.1.3 Pearl millet grains shall be free from filth (impurities of animal origin, including dead insects) in amounts which may represent a hazard to human health.
- 3.1.4 Pearl millet grains shall be free from foreign or extraneous matter.
- 3.1.5 Pearl millet grains shall be free from noxious seeds.

3.2 Quality Factors - Specific

3.2.1 Moisture Content

The maximum percentage of moisture allowed by purchasers will not exceed **12.5%**.

3.3 Definition of Defects

Defective kernels are considered to be pearl millet kernels or pieces of pearl millet kernels:

- which passes through a screen of 1.4mm round holes;
- which are wizened, obviously unmaturred, frost damaged or mouldy;
- which are sprouted;
- with cavities caused by insets or rodents;
- which are otherwise clearly of inferior quality (internal and external heat damage, fungi or deceased kernels); and,
- Which are weather damaged.

Foreign matter or extraneous matter means any matter other than mahangu kernels.

3.4 Tolerances for Defects

A tolerated defect, or allowed deviation, is the amount of impurities allowed in pearl millet offered for grading which takes into consideration the traditional threshing methods and the provisions of the internationally recognised grading standard for pearl millet under Codex Alimentarius which addresses the hazard to human health which may arise out of impurities. Tolerated defects relate to all impurities defined as foreign or extraneous matter, but not to kernel size and broken kernels as long as they do not pass through a sieve with 1.4mm round holes.

Description of deviation	Maximum percentage of deviation allowed (m/m)					
	Okashana I			Farmers local variety		
	Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3
Foreign matter above 3.35 mm sieve	2.0%	3.0%	4.0%	2.0%	3.0%	4.0%
Foreign matter above 1.4 mm sieve	0.5%	0.6%	0.7%	0.5%	0.6%	0.7%
Foreign matter below 1.4 mm sieve	5%	10%	15%	5%	10%	15%
Total deviations	7.5%	13.6%	19.7%	7.5%	13.6%	19.7%

4. CONTAMINENTS

4.1 Heavy Metals

Pearl millet grains shall be free from heavy metals in amounts which may represent a hazard to human health.

4.2 Pesticide Residues

Pearl millet grains shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

4.3 Mycotoxins

Pearl millet grains shall comply with those maximum mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP1-1969, Rev. 2-1985, Codex, Codex Alimentarius Volume 1B) and other Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

5.3 When tested by appropriate methods of sampling and examination, the product:

- shall be free from micro-organisms in amounts which may represent a hazard to health;
- shall be free from parasites which may represent a hazard to health; and,
- shall not contain any substance originating from micro-organisms in amounts which may represent a hazard to health.

6. PACKAGING

6.1 Pearl millet grains shall be packaged in containers which will safeguard the hygienic, nutritional, technological, and organoleptic qualities of the product.

6.2 The containers, including packaging material, shall be made of substances which are safe and suitable for their intended use. They should not impart any toxic substance or undesirable odour or flavour to the product.

6.3 When the product is packaged in sacks, these must be clean, sturdy and strongly sewn or sealed.

7. METHODS OF ANALYSIS AND SAMPLING

Samples of pearl millet taken for the purpose of grading shall be taken in such a manner as to be representative of such pearl millet. The following methods shall be used in order to determine the grade of mahangu:

7.1 Bulk grain: method of sampling

7.1.1 If a sample is to be drawn from bulk grain in a truck, two (2) samples shall be taken at each hatch of the truck by means of a bulk grain probe of suitable length, with multiple apertures on the one side. The probe is to be inserted as deep as possible crosswise into the length of the truck.

7.2 Bagged Grain: method of sampling

7.2.1 The following method shall be used in obtaining a representative sample:

- 1) Number of bags to be sampled.
- 2) If a consignment of grain consists of 25 bags or less, a sample shall be drawn from each bag.
- 3) If consignment consists of 250 bags or less, but more than 25 bags, samples shall be drawn from at least 10% of the bags distributed over the consignment.
- 4) Where a consignment of grain consists of more than 250 bags, samples shall be drawn from at least 25 bags, samples shall be drawn from at least 10% of the bags distributed over the consignment.

7.2.2 From every bag more or less equal quantities of grain shall be drawn with a grain probe (bag probe). The length of the probe should approximately be 450 mm, the diameter should not be more than 19 mm. Insert the probe horizontally into the bag, with the opening facing downwards. After the probe has been inserted, turn it 180° so that the opening faces upwards. This is done to ensure that one samples the center and not only the outside layer of the bag.

7.3 All grain: alternative method of sampling

7.3.1 If it is found to be impossible to obtain a representative sample by means of a probe, a number of bags selected at random, shall be opened and an adequate quantity of grain removed with a suitable scoop from various positions in the bags.

7.4 All grain: division of sample

7.4.1 After the sample has been obtained as indicated, it shall be thoroughly mixed in a basin or bucket and divided in accordance of one of the following methods:

7.5 All grain: quartering

7.5.1 The sample shall be poured onto a flat surface and mixed again. The sample shall then be divided into two equal portions by means of a board or metal plate and the two portions shifted slightly apart. By the same method, the two halves shall be sub-divided by partitioning them at right angles to the previous line of division, so that four, more or less equal portions are obtained. Two diagonally opposed quarters shall then be removed and the two remaining quarters thoroughly mixed and in the same Manner divided into four parts. This process of quartering shall be repeated, until the required quantity of 200 grams is obtained.

7.6 All grain: quartering by means of a multiple-slot divider

7.6.1 The multiple-slot divider used for this purpose shall conform to the following description:

7.6.2 It shall consist of a dividing apparatus and three hoppers. The apparatus shall have at least twelve slots with a width of between 25mm and 30 mm and not less than 100 mm in length. Every two successive slots shall empty in opposite directions. The divisions between slots shall not be more than 3 mm thick. At the top the group of slots shall be surrounded by a wall high enough to prevent grain from overflowing, when a sample is poured into it for dividing. The apparatus shall be provided with legs of sufficient height to enable grain to fall freely into any of the two hoppers, placed underneath the opposite outlet slots, is caught in the hoppers. The sample shall be poured through the multiple-slot divider and the portion caught at one group of outlet slots, emptying in one direction shall repeatedly be poured through the divider until the required quantity of grain is obtained.

7.7 All grain: difference in samples

7.7.1 If the sample obtained as described is used for determining the grade of the grain and if it appears from the results of the grading that the grade or class of the consignment of grain concerned, is on the borderline between two grades or classes, or if a dispute arises over the grade or classes, a second sample shall be obtained from the main sample by means of dividing method previously described and a further determination of grades will be made. If there is any difference placing the latter sample in grade or class differing from that of the first sample, a sample twice the size of the main sample shall be drawn from the consignment. By means of the dividing method previously applied, a suitable sample shall be obtained on which the final determination of grade shall be done.

7.8 All grain: descriptive of sieves to be used

7.8.1 For the purpose of grading the following sieves are recommended:

- one 450 mm diameter, 3.25 mm aperture wire mesh sieve;
- one 450 mm diameter, 1.40 mm aperture wire mesh sieve; and
- one 450 mm diameter receiving pan.

7.8.2 The sieves should be used on top of each other in the above-mentioned sequence.

7.9 All grain: screening process

- 1) Sieve sample by using at least 30 (thirty) forward and backward motions for 1 (one) minute
- 2) Establish the mass of foreign matter above the 3.35 mm sieve and convert the mass into a percentage.
- 3) Establish the mass of foreign matter above the 1.4 mm sieve and convert the mass into percentage.
- 4) Establish the mass of foreign matter below the 1.4 mm sieve and convert the mass into percentage.
- 5) Add up the percentage obtained in order to establish the total deviations.
- 6) Compare the deviations with the allowed deviations as set out in the table for mahangu grading and establish the grade of the sample.
- 7) Repeat the above-mentioned steps with another sample, obtained in the prescribed manner, and establish the average between the two which will serve as your official grade.

7.10 All grain - further alternative method of sampling

See Codex Alimentarius Volume 13.
