

# DRAFT TANZANIA STANDARD

Harvest and post Harvest Handling for (Paddy) rice grains - Code of practice

# TANZANIA BUREAU OF STANDARDS

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# 0. Foreword

Post-harvest losses for rice grains can occur at any point after harvest during drying, threshing, shelling, winnowing, sorting, aggregation, transportation and storage. Post-harvest losses of rice grain are estimated to be upto 20%. Reducing post-harvest losses can increase the volume and value of grains within the market and available for consumption and sale.

This standard has been developed to take into account:

- a) the needs of the market for the quality rice grains;
- b)t the need to facilitate fair domestic, regional and international trade and prevent technical barriers to trade by establishing a common trading language for crop producers, buyers and sellers;
- c)the needs of the producers in gaining knowledge of market standards, conformity assessment and postharvest handling;

d)the need to transport the product in a manner that ensures keeping of quality until it reaches the consumer;

- e) the need for compliance of the quality and safety parameters of the product
- f)the need to promote good agricultural practices that will enhance wider market access, involvement of smallscale traders and hence making farming a viable means of generating income.

# Post-Harvest Handling and Storage (PHHS) for rice grains (oryza ssp.) — Code of practice

# 1 Scope

This Tanzania Standard prescribes the code of practice for harvest and post-Harvest Handling for rice (Paddy) grains (*Oryza spp.*).

# 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

TZS 592, *Milled rice* — *Specification* TZS 1675,Paddy rice- Specification TZS 109, Food Processing unit – Code of Hygiene

# 3 Terms and definitions

For the purposes of this standard, the following terms and definitions should apply.

# 3.1 rice (paddy) grain

Whole or broken unhulled kernels of rice

# 3.2 milled rice

whole or broken kernels of rice (*Oryza spp*) from which the hulls and at least the outer bran layers have been removed

# 3.2

# harvesting

operation of gathering the crop with matured earheads

## 3.3

#### threshing

operation of separating the grains from the crop with matured earheads using manual or power operated thresher

# 3.4

#### winnowing

operation of separating the clean and matured grains from the threshing wastes like chaffy, immature grains, soil particles and other foreign materials

# 3.5

### drying of grains

operation during which the threshed grains are dried to the safe storage moisture content of 14% so as to undergo the next operations of cleaning, packaging and storage

#### 3.6

## grain cleaning

operation of separating the clean and matured grains from the milling wastes like hull, stones, immature grains, soil particles and other foreign materials

### 3.7

### destoning

rice is passed through a specific gravity table that separates the product by density. Stones are separated from the rice

### 3.8

### husking

husk is removed from the paddy by passing the paddy through two tightly pressing spinning rubber roles in which one roll is spinning faster than the other

3.9

#### bran

by product from rice milling consisting of the outer (pericarp) layers of the kernel with part of the germ

#### 3.10

#### foreign matter

all organic and inorganic material other than rice grains, broken kernels, other grains and filth

3.11

#### moisture content

amount of moisture in the grain expressed as percentage of the total weight of the sample

# 3.12

#### pest management

pest management includes the prophylactic treatment using the spraying of chemicals and the curative treatments like fumigants and insecticides

# 3.13

#### transportation

process of moving of paddy/rice from one location to another during different unit operations of postharvest handling

#### 3.14

#### post harvest losses

measurable quantitative and qualitative loss of paddy/rice occurred during the various post harvest operations like harvesting, shelling, drying, cleaning, transporting and storage.

#### 3.15 quantitative losses

is a loss in terms of physical substance, meaning a reduction in weight and volume and can be assessed and measured.

#### 3.16 qualitative losses

losses which are difficult to quantify in financial terms. Note: A qualitative loss does not mean that no actual loss is incurred. It merely signifies that the full ramifications of the loss cannot be calculated precisely.

#### 4. General guidelines

Throughout the whole process of PHHS, the following should be considered:

a) the product being handled should comply with TZS 592 and TZS 1675;

b)hygiene conditions should be maintained throughout the whole process of PHHS as per TZS 109;

c)materials and equipment used should comply with the requirements of relevant Standards; and

d) chemicals and their use should comply with national standards and regulations.

## 5. Specific guidelines

## 5.1 Pre-harvesting

Farmers should be well prepared for the harvesting of paddy by arranging man power, harvesting tools and equipment, drying and threshing yard, storage facilities and storage pest management. Some of the guidelines for pre- harvesting are:

a)prior to the harvest, it is important that farmers are already prepared for their harvesting and post harvest activities and theyshould ensure that:

- i. the equipment needed for their harvest and harvesting and post harvest activities is available and in good workingcondition;
- ii. they have identified the place of important activities like drying and threshing yard;
- iii. there will be sufficient storage space for the crop;
- iv. the grain stores and used sacks have been thoroughly cleaned and disinfected; and
- v. the residues of the old harvest (last season's crop) has been removed from all cracks and crevices and disposed in a hygienic manner.
- b)farmers should ensure the timely harvest of the paddy crop to avoid losses and the following should be considered:

- (i) the time of harvesting can be identified by the change of colour of the plant from green to yellow showing the maturity of grains;
- do not wait for stalks and leaves to dry because they remain green in some of the hybrid and composite varieties;drain out the water from paddy field about a week or 10 days before the expected harvesting time,which helps in employing mechanical harvesters; and
- (iii) farmers can open a paddy in the field itself and test the hardness, size, shape and maturity of the graininside the paddy and decide the time of harvesting.

c) avoid pest infestation prior to harvesting; and

# 5.2 Harvesting

Harvesting activity should be done as follows:

- a) the paddy crop is to be cut at the stalk 5 cm 7 cm above the ground level depending on the variety;
- b) paddy should be harvested when the grains are hard and matured with optimum moisture percentage of 20 % 25 % to avoid field loss of grains by shattering;
- c) harvesting before maturity means a low milling recovery and also a higher proportion of immature seeds, high percentage of broken rice, poor grain quality and more chances of disease attack during storage of grain;
- d) delay in harvesting results in grain shattering and cracking of rice in the husk and expose the crop to insects, rodents, birds, pests attack, as well as lodging and consequently leads to more field and transportation losses;
- e) avoid harvesting during wet weather conditions;

f)harvesting should be done by adopting proper method and avoid missing of the secondary tiller panicles;

- g) the harvested crop should be tied into a bundle and carry it to threshing yard without much transportation loss;
- h) harvested material should be protected from the rain and excessive dew by covering;

i)harvested paddy should be kept separately for each variety, to get true to type variety (grains);

k) the contact of the earheads with soil should be avoided as it can be source of contamination or attack by insects; and

I)harvested rice crop should be transported immediately to the threshing yard.

# 5.3 Threshing

Threshing should be done as follows:

a)the machine used for threshing should comply with relevant Standards

b)threshing may be done by manual methods like beating the earheads with a light wooden sticks on a clean floor or by power operated multi crop thresher for large quantities;

- c)techniques that cause damage to the grains such as severe beating with sticks should be avoided to prevent the damage of grains;
- d)when power operated threshers are used, the clearance between the concave and cylinder should be adjusted so that the percentage of broken grains should be avoided;
  - e)power operated thresher should have operator safety arrangements like the belt and pulley guard as per the relevant standard; and

f)threshing machine should not be a source of contamination including by rust, paint, grease etc,.

### 5.4 Drying of grain

The following should be considered in drying of rice (paddy) grain:

a) the drying of the grains should be done immediately after threshing;

b) the rice grains should be dried to 13.5 % moisture content prior to packaging and storing;

c)the drying area (concrete floor, mat, etc) should be clean and not be a source of contamination to the grains; and

d)where heated air is used to dry the grains, temperature and drying time should be synchronized so that they do not result in adverse effect on the nutritional composition and quality of the grains in its intended use.

# 5.5 Cleaning and sorting

Cleaning may be done manually or by using machine:

a)when power operated cleaning machine is used, care should be taken by adjusting the fan speed to reduce the loss of grain in the chaffy outlet;

b)the grains should be aspirated to remove all the straws, chaff and leafy vegetative matter;

c)defective (mouldy, discoloured, shrivelled, rotten, broken, insect damaged, etc) grains should be removed;

d)sorting should be done before grading and any treatment; and

e) grading should be in accordance with TZS 592 or TZS 1675.

# 5.6 Packaging

Rice grain should be packaged according the following:

a)rice grain should be packaged in clean and food grade packaging materials;

b)rice grain should be packed in containers which will safeguard the hygienic, nutritional, and organoleptic qualities of the products;

c)each package should contain rice grains of the same type and of the same grade designation;

d)packaging container should be free from pests and contaminants; and

e)each container should be securely closed.

# 5.7 Transportation

Transportation of rice grain should consider the following:

- a) rice grain should be handled and transported in such a way so that they remain well protected from sun, rain or other sources of excessive heat, objectionable odour and from any type of cross infestation;
- b) the rice grains may be transported in vehicle itself (bulk) or in transportable container then the vehicle and container should be clean, dry and free from undesirable odours and infestation;
- c)if the vehicle is not fully enclosed, it should have a covering such as tarpaulin to keep out of the rain or any form of water or sun.
- d)transported rice grains should be well ventilated with dry air to remove moisture resulting from respiration of the grains and to prevent moisture condensation; and
  - e) transportation of rice grain with chemicals, products in liquid form or any other substances which may contaminate the rice grain should be avoided.

#### 6 Major storage pests and their control measures

Measures should be taken to control insect infestation using either physical, chemical, mechanical or biological means or combinations of these methods. Assistance may be obtained from extension officers/agricultural officers and other authorized pest control experts on the respective areas in identification and control of storage pest. The list of prevalent storage pest are given in Annex A.

# Annex A

# (informative)

# Major storage pests for rice (paddy) grain

The damages of major stored grain pests of rice along with their control measures are given below:

Name of pest and figure of pest	Damage	
<b>1. Rice weevil</b> Sitophilus oryzae (Linn.)	Adults and Larvae both bore into grains and feed on the grains	
<b>2. Lesser grain borer</b> Rhizoperth dominica (fabr.)	Beetles and larvae both penetrate the grain and feed Sometimes, larvae feed on the waste flour produced by the adults. Heavy infestation makes the grain warm and moist which leads to mould formation. It eats maily paddy kernels but may also damage milled rice.	
3. Khapra beetle Trogoderma granarium	Larvae are a serious stored pest but the beetle itself does not damage. First the larvae feed germ portion and later other partsof the grains	
<b>4. Saw toothed grain beetle</b> Oryzaephilus surinamensis (Linn.)	Both beetle and larvae feed broken grains and damaged grains of other insects. They are usually found as a secondary pest together with other grain pests.	

5 Red rust / Confused flou	Beetle and larvae both do not cause damage to whole grain but feed on
<b>beetle</b> Tribolium castaneum (Herbst., Triboliumconfusum (J.du V.)	broken and damaged grains produced by milling and handling or infested / damaged grains of other insects
6. Tropical ware housemoth Ephestia cautella (walk)	The moth is usually found in warehouses. The larvae feed on damaged or processed grains leaving the whole grains undamaged. In heavy infestation, larvae cover all available surface with webbing.
7. <b>Rice moth</b> Corcyra <i>cephalonica</i> (Staint)	Larvae feed broken and processedpaddy/rice. Larvae produce dense webbings. Whole grain kernels arebound into lumps.

8. Rodents	Rodents eat whole grains broken grains, flour etc. The	з, У
	spill more grains than the eat. Rodents also contaminate rice grains with	y o h
	nair, urine and feces, which cause diseases like	s

cholera, food poisoning, ringworm, rabies etc. They also damage the storage structures and other accessories of store like wire and cable etc.	