NIGERIAN CODE OF PRACTICE

Code of Hygienic Practice For The Prevention of Mycotoxin Contamination In Melons During Storage And Transportation (Citrullus species.)

ICS:

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FOREWORD

In order to promote best practices in storage and transportation of melons and to ensure that customers get wholesome products, the Standards Organisation of Nigeria authorized the development of this code of practice.

The expert technical committee on Mycotoxin Prevention considered the need to elaborate on this code of hygienic practice to encourage the farmers produce mycotoxin free melon seeds while ensuring consumer safety, fair trade practices and keeping pace with development in trade and commerce.

Melons (citrullus colocynthis L) or its hybrid is highly nutritious and an important leguminous plant in Nigeria. The product is an important source of protein in Nigeria and a potential foreign exchange earner but production has been largely at subsistence levels. However, in recent times there has been a rise in exportation of the packaged form of the product.

While elaborating this code, reference was made to relevant Nigerian Industrial Standards. Inputs provided by farmers and other stakeholders are hereby acknowledged.

1.0 SCOPE

The scope of this standard shall include prevention of mycotoxins contamination in melon (citrullus species) through application of Good Manufacturing Practices during storage and transportation. This code applies to farmers, handlers and transporters of melon seeds.

This code of practice excludes: code of hygienic practice for harvesting and processing melon seeds, code of Good Agricultural Practice for planting of melon seeds and the handling of grinded melon seeds.

2.0 NORMATIVE REFERENCE

The following references contain provisions applicable to this Nigerian Industrial Standard. At the time of publication the editions indicated were valid. These Standards and Publications are subject to revision and parties to this Standard are encouraged to investigate the possibility of applying the recent edition of the references indicated below*:*

(i) Nigerian Industrial Standard of for Specification for Melon Seeds.
(ii) Codex Alimentarius Commission / RCP 2 Code of Practice for general principles of food hygiene.
(iii) Codex Alimentarius Commission VOL2B Maximum Limits for Pesticides residues.
(iv) Codex Alimentarius Commission Standard on pre-packaged food labelling
(v) Codex Alimetarius Commission /RCP 1 "Hazard Analysis and Critical Control Point (HACCP) System and Guidelines for its Management".

3.0 TERMINOLOGY

For the purpose of this code, the following definitions and terms shall apply:

3.1.0 contaminants

Any foreign substance that constitutes impurity in products or commodities.

3.2.0 control measure

Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

3.3.0 Critical Control Point (CCP)

A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

3.4.0 critical limit

A criterion which separates acceptability from unacceptability.

3.5.0 HACCP

A system which identifies, evaluates, and controls hazards which are significant for food safety.

3.6.0 HACCP plan

A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food safety in the segment of the food chain under consideration.

3.7.0 hazard analysis

The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

3.8.0 husk

The dry leafy exterior of melon seed which should be removed before cooking.

3.9.0 insecticide

Any substance used to control, inhibit or stop the degrading activities of insects

3.10.0 monitor

The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

3.11.0 mycotoxins

Poisonous or lethal substances produced or secreted by moulds, or fungi, that is injurious to animals and humans when consumed. E.g Aflatoxins B_1, B_2, G_1, Ochratoxins, Citrinin, Patulin, Fusarium.

3.12.0 peeled

Seed without the husk and ready for consumption.

3.13.0 pesticide

Any synthetic or biological substance used to inhibit or stop the activities of pests from reducing the wholesomeness of a commodity.

3.14.0 toxins

Poisonous or lethal Substances produced or secreted by biological entities.

3.15.0 Standard Operating Procedure

A statement, pictorial representation or form that describes a particular way in which an activity shall be performed.

3.16.0 processing

The act of refining or adding value to a raw material.

3.17.0 validation

Obtaining evidence that the elements of the HACCP plan are effective.

3.18.0 verification

The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

4.0 Storage Requirements

4.1.1 Storage facilities shall include dry, well-vented structures that provide protection from rain, drainage of ground water, protection from entry of rodents and birds, and minimum temperature fluctuations.

4.1.2 Melon seeds shall be dried to discourage the growth of fungal spores.

4.1.3 The mycotoxin level in in-bound and out-bound melon seeds shall be monitored when warranted, using appropriate sampling and testing programs (Specification for melon seeds).

4.1.4 For melon seeds in bags, bags should be clean and dry. Bags shall be stacked on pallets

4.1.5 Melon seeds shall be stacked in a manner that allows the free circulation of air between stacked bags.

4.1.6 Moisture content and temperature in the stored seed shall be monitored at regular intervals during the storage period.

Note: A rise in temperature of the stored product is an indication of insect infestation and fungal infestation.

4.1.7 Infected melon seeds shall be separated and samples of such melon seeds subjected to analysis. When separated, the melon seeds shall be bagged and arranged in a manner that allows circulation of air between the bags.

4.1.8 Minimize the amount of foreign materials and damaged melon seeds in store.

4.1.9 Standard Operating Procedures for processes in storage of melon seeds shall be developed.

4.1.10 Records of activities performed in the storage of melon seeds shall be established.

4.2 Good Housekeeping

4.2.1 Good housekeeping procedures shall be used to minimize the levels of insects and fungi in storage facilities. This includes the use of suitable, registered insecticides and fungicides or appropriate alternative methods.

Care shall be taken to select only those chemicals that will not interfere or cause harm based on use of the melon seeds and chemicals should be strictly limited.

Safety procedures

4.2.2 The use of a suitable, approved preservative (e.g., organic acids such as propionic acid) is beneficial. These acids are effective in killing various fungi and thus prevent the production of mycotoxins in melon seeds. The salts of the acids are usually more effective for long-term storage. However, care must be taken because these compounds can negatively affect the taste and odour of the seed.

4.2.3 Storage procedures implemented in each period shall be documented by taking notes of measurements (e.g., temperature, moisture, and humidity) and any deviation or changes from normal practices (See Specification for melon seeds).

Note: This information is very useful for explaining the cause(s) of fungal growth and mycotoxin formation during a particular crop year and help to avoid similar mistakes in the future.

4.2.4 Standard Operating Procedures for application of preservatives in storage of melon seeds shall be developed.

4.2.5 Records of activities performed in application of preservatives during storage of melon seeds shall be established.

5.0 Transport from storage

5.1.1 Transport containers shall be dry and free of visible fungal growth, insects and any contaminated material. Transport containers shall be cleaned and disinfected before use.

The use of appropriate fumigants or insecticides is useful.

Careful as to what chamicals used and how – see 4 above

5.1.2 Shipments of melon seeds shall be protected from moisture by using covered or airtight containers.

5.1.3 Avoid temperature fluctuations and measures that cause condensation to form on the melon seeds, which could lead to moisture build-up and consequent fungal growth and mycotoxin formation.

5.1.4 Insect, bird and rodent infestation shall be avoided during transport by the use of insect and rodent proof containers.

5.1.5 Transportation of melon seeds shall be conducted in a manner that protects food fron sources of contamination or damage likely to render melon seeds unsuitable for consumption.

5.1.6 Transportation of melon seeds shall conducted a manner which effectively controls the growth of pathogenic or spoilage micro-organisms and the production of toxins in melon seed.

5.1.7 Each container of melon seed shall be indelibly labelled to identify the producer/ processor and the lot.

5.1.8 Standard Operating Procedures shall be put in place to recall any infested or contaminated product.

5.1.9 Recall products shall be held under supervision until they are destroyed or reprocessed in a manner to ensure their safety.

5.1.10 Standard operating procedures for each process shall be developed.

5.1.11 Records of activities performed in the period of storage shall be established.

5.2 Hygienic requirements for storage

Table 1: Hygienic Requirement for Storage

Environmental Hygiene	Care shall be taken to prevent, so far as reasonably practicable, deterioration and spoilage through appropriate measures which shall include controlling temperature, humidity, and other controls.
Cleaning, Maintenance And Personnel Hygiene At Primary Production	Facilities and procedure shall be in place to ensure that: cleaning and maintenance is carried out effectively Appropriate degree of personal hygiene is maintained. There is effective protection against pest access and harbourage. **Note:** Attention to good hygienic design and construction, appropriate location, and the provision of adequate facilities, is necessary to enable hazards to be effectively controlled.
Housing	Housing facilities for melon seeds shall be located in areas that are free from environmental pollution which pose a threat to contamination, flooding, pest and areas where waste can be effectively removed.

	Separate secure storage facilities for cleaning materials and hazardous substances shall be provided.
Equipment	Equipment shall function for its intended use. Shall permit adequate maintenance and cleaning Shall facilitate good hygienic practices and monitoring.
Design And Layout	The internal design and layout of food establishments shall permit good food hygiene practices, including protection against cross-contamination between and during operations by foodstuffs.
Internal Structures And Fittings	Storage facility shall be soundly built of durable materials and be easy to maintain, clean and able to be disinfected. In particular the following specific conditions shall be satisfied to protect the safety and suitability of food: Walls and partitions shall have a smooth surface up to a height appropriate to the operation. • Ceilings and overhead fixtures shall be constructed and finished to minimize the build-up of dirt and condensation, and the shedding of particles; • Windows shall be easy to clean, be constructed to minimize the build-up of dirt, be fitted with removable and cleanable insect-proof screens. • Doors shall have smooth, non-absorbent surfaces, and be easy to clean and disinfect. • Working surfaces that come into direct contact with food shall be in sound condition, durable and easy to clean, maintain and disinfect. They shall be made of smooth, non-absorbent materials, and inert to the food, to detergents and disinfectants under normal operating conditions. Light of good intensity shall be provided
Personnel Hygiene Facilities And Toilets	Personnel hygiene facilities shall be available to ensure that personal hygiene are maintained and to avoid contaminating food. Facilities should include: • adequate means of hygienically washing and drying hands, including wash basins and a supply of water shall be provided. • lavatories of appropriate hygienic design, • Adequate changing facilities for personnel. Such facilities should be suitably located and designated.
Air Quality And Ventilation	Ventilation systems shall be designed and constructed so

	that air does not flow from contaminated areas to clean areas. The ambient temperature, and humidity are maintained in a manner that maintains the integrity of the melon seeds.

5.3 Training

5.3.1 Personnel shall be trained periodically for assessment and effectiveness.

5.3.2 All personnel shall be aware of their responsibility in protecting food from contamination and deterioration.

5.3.3 Food handlers shall have the necessary knowledge and skill to enable them to handle food hygienically.

5.3.4 Records of training activities shall be established.

6.0 Marking and Labelling

6.1.0 Labelling Requirement

6.1.1 Peeled melon seeds shall be whole and labelled accordingly, a maximum of 5% broken seeds in a bag of 100kg shall be permitted. (Multiples of such shall be replicated)

6.1.2 Broken seed shall be bagged separately and shall be indicated thus.

6.1.3 Marking of packaged seeds peeled or unpeeled should have the following information.

6.1.4 Name of product/Brand/
6.1.5 Date marking: the date, month and year of packaging and best before date.
6.1.6 Net Content shall be declared in metric system
6.1.7 Temperature of storage
6.1.8 Moisture content
6.1.9 List of Preservatives used in descending order of proportion
6.1.10 Condition of storage: Shall be stored in a cool dry place.
6.1.11 MANCAP Logo and certificate Number (If product is certified)
6.1.12 NAFDAC registration number and Bar coding
6.1.13 Batch number

Annex

PRINCIPLES OF THE HACCP SYSTEM

The HACCP system consists of the following seven principles:

HACCP DESCRIPTION	PRINCIPLE
Conduct a hazard analysis.	A detailed step by step diagram of the process is prepared, identifying where significant hazard occur
Determine critical control point	Critical Control Points (CCPs), points at which the hazards can be controlled, are identified throughout the process.
Establish critical limits.	These are limits that must be adhered to if risk is to be minimized
Devise a monitoring programme.	Monitoring is critical in any HACCP programme to ensure control points remain under control
Define corrective actions.	If a control point is shown to be out of range, corrective measures must be implemented
Establish verification procedures.	Verification that the HACCP plan is successfully controlling mycotoxin contamination is necessary. At this point, some chemical analysis of the product is required. If contamination is found to exceed limits, immediate action is necessary to identify the step or steps at which failure has occurred. This may mean new CCPs are identified, critical limits are adjusted or the monitoring programme is altered.
Develop documentation and record keeping.	A successful HACCP programme relies on comprehensive documentation of procedures and records. This will usually involve a flow diagram of the process; the hazard and risk assessment; and a list of CCPs, critical limits and monitoring programmes. Ongoing records of monitoring and corrective action must be kept for consultation as well as the results of

HACCP DESCRIPTION	PRINCIPLE
	verification. Operation requirements for staff and records of staff training should also clearly documented and available. An audit of a HACCP system will include an examination of all this documentation and must be satisfactory should accreditation be desired.