



**DRY BEANS - CODE OF GOOD PRACTICE-
STORAGE AND TRANSPORTATION**

Group:

SON

Price

ICS XX: XXX

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FOREWORD

Nigeria is recognized as one of the commercial dry beans producing and exporting Countries in the world. Being an important source of foreign exchange, it is essential to ensure that the dry beans offered for sale and or consumed by the public is wholesome and safe.

This Code of Good Practice was elaborated by the technical committee on dry beans to provide guidelines for proper storage and transportation of dry beans in a safe and hygienic environment.

In elaborating this code of practice, relevant information were obtained from National and International Standard bodies, Research Institutes and other stakeholders, all of whom are hereby acknowledged.

DRAFT

1.0 SCOPE

This Nigerian Code of practice provides guidelines for storage and transportation of dry beans. It applies to farmers, handlers and transporters to ensure availability of quality and safe dry beans throughout the year. It excludes planting, harvesting, processing and packing.

2.0 NORMATIVE REFERENCE

The following referenced documents are indispensable for the application 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.

- (i) Food and Agriculture Organization of the United Nations (FAO), COWPEA: Post-Harvest Operations
- (ii) Codex Alimentarius 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 pesticides

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

4.0 Storage Requirements

4.1.1 Storage after harvesting

4.1.2 Beans should meet the requirements for the standard for dry beans before being stored (NIS XXX:2016),

4.1.3 Harvested dry beans will "heat" resulting in spoilage unless kept cool.

It is recommended that dry beans is stored short term at 12% moisture or less, with 8% to 9% recommended for long-term storage.

4.1.3 Storage facilities should 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.

4.1.4 Properly dried beans are less easily attacked by insects and fungi. Stored beans should not be kept on the bare floor to avoid migration of moisture.

4.1.5 Dry beans for storage should be healthy, not broken or damaged as this encourages insect infestation. Storage of dry beans may be done in rumbus, steel drums/tins, polythene bags or silos. The storage structures should be air-tight to starve the insect of oxygen. Rumbus should be properly cleaned before use for storage.

Cracks on the walls, roof and floor of rumbus should be mended to deny insects of hiding places.

4.1.6 Infested dry beans should be fumigated with registered and approved fumigants. Surface acting agents such as (Actellic E.C or Nuvan E.C) can be sprayed on beans at manufacturer recommended rate.

4.1.7 Safe Fumigation protocols should be closely followed when fumigating bean stores. Permitted fumigants shall be used and correct health and safety procedures shall be followed at all times.

Any residual material such as fumigation tablets and pouches shall not come into contact with the stored beans and shall be removed after the prescribed exposure time.

4.1.8 Other pesticides such as sprays shall be used if permitted and in accordance with the application protocols supplied by the manufacturer and the correct health and safety procedures shall be followed. Correct waiting intervals shall be observed.

4.1.9 Records shall be maintained of all pesticide applications.

[the committee should consider developing a separate code of practice for the application of pesticides]

4.1.7 Stored beans should be inspected frequently to enable early detection of infestation.

4.1.8 Stores should be in some reasonable distance from the field to discourage re-infestation.

4.2 Storage: the following storage techniques can be used;

Breeding for storage- New hybrid dry beans that will be resistance to pest and disease are presently being researched.

Genetic transformation – this is the genetic manipulations of dry beans. Work is still on going to produce beans that are wholesome and resistance to pest and diseases.

Solar dis-infestation-The output is a simple but effective solarisation technique, which harnesses the power of the sun to reduce pest damage on stored beans to acceptable levels. Appropriate exposure of dry beans to the sun can lead to a temperature rise

sufficient to kill most, if not all, of the pests - eggs, larvae and adults - on and inside the beans. Germination tests showed that beans stored with this technique remains viable.

Hermetic storage-Air-tight storage-PICs-

Recent evolution of pesticide-free post harvest hermetic storage for dry commodities is now used in 81 countries for the storage of grain and other commodities. Flexible plastic structures have been developed and applied to long-term storage. A growing number of types of such hermetic containers now exist especially for tropical conditions.

Hermetic storage is particularly important in tropical and semi-tropical areas with elevated temperatures and high humidity.

Insects multiply best at 30°C, as well as at humidity levels above 65% and molds grow exponentially above the critical moisture level. Growth of mycotoxins produced by molds, including aflatoxins and ochratoxins is inhibited by both the lack of oxygen and lack of high moisture content.

Hermetic storage has become a replacement for older storage methods, particularly in hot, humid climates because of its “green”, chemical-free technology, control of moisture content, avoidance of pesticides and of need for refrigeration. It can achieve 100% “kill” of insects and control of molds and free fatty acids (FFAs).

Hermetic storage features flexibility of installation (indoors or outdoors), portability, and attractive cost. The simple principle involved in hermetic storage is to control moisture and allow depletion of oxygen with increase in CO₂ through respiration of both the commodity and insects. Typically at room temperature or above this creates an unbreathable, low oxygen atmosphere within a few days, and reduces storage losses to <1%.

4.2.1 Types of hermetic containers:

4.2.2

Beans shall be stored in Storage bags and containers made of acceptable Hermetic material some examples of which include:

Bags and containers shall not be re-used.

60kg to 2-tonne flexible portable containers;

bulk storage for household or farm use and daily withdrawal of grain of 1-tonne to 2 - tonne capacity.

, flexible enclosures of 5- to 1,050-tonne capacity designed for storage at the farmer-cooperative and small trader level or larger commercial and strategic storage facilities;

for long term storage in bulk of 10,000- to 20,000-tonnes;

provide quality preservation, insect control, and prevention of condensation during shipment of bagged commodities in containers across intercontinental distances.

Steel Drums/Tins-Dry beans storage in steel drums and tins is a form of hermetic storage where the storage structures are air-tight. No chemical is used for this storage.

Polythene bags- The method like other hermetic storage structures may require no chemical

Food grade Polythene - lined woven polypropylene bags

Food grade Polythene – lined hydrocarbon free Jute Bags

Silos- Butyl rubbers or aluminium silos may be used. These are suitable for large scale storage of threshed dry beans and are recommended mainly for companies, ministries and co-operatives. Dry beans stored in silos may be fumigated every three months starting from two or three weeks of storage

Purdue Improved Cowpea Storage PICs- special plastic bags are developed to protect cowpeas in storage from destruction by weevils. This involves triple bagging technology which prevents weevils from accessing oxygen for metabolism.

5.0 Transportation

5.1 Means of transporting dry beans should be by truck, ship or railroad in a manner that prevent contamination; damage likely to render the seeds unsuitable for consumption.

5.2 Transporting of stored beans should be conducted in a manner which effectively controls the growth of pests or spoilage

5.3 Each container or bag of dry beans should be permanently marked to identify the producer/ processor and the lot.

5.4 Standard Operating Procedures should be in place to recall any infested or contaminated dry beans.

5.5 Recalls should be held under supervision until they are destroyed or reprocessed in a manner to ensure safety.

5.6 Standard operating procedures for each process should be developed.

6.0 Training

6.1 Personnel should be trained periodically for assessment and effectiveness.

6.2 All personnel should be aware of their responsibility in protecting food from contamination and deterioration.

6.3 Dry beans handlers should have the necessary knowledge and skills to enable them handle hygienically.

6.4 Records of training activities should be established.

7.0 Application of HACCP System

HACCP system should be in place to enhance food safety, aid inspection by regulatory authorities and promote international trade by increasing confidence in food safety.