



DRAFT TANZANIA STANDARD

Code of hygienic practices for sprouts production

DRAFT FOR STAKEHOLDERS' COMMENTS

TANZANIA BUREAU OF STANDARDS

0 Foreword

Sprouting is the natural process, by which seeds or spores germinate and put out shoots, and already established plants produce new leaves or buds or other newly developing parts experience further growth.

Popularity of sprouted seed has increased dramatically and is favoured by their nutritional value. However, risks of food borne illness associated with increased sprout consumption raised concerns and necessitated elaboration of this guideline for sprout production.

This code will guide farmers, processors, exporters and importers in handling, transportation, storage for purpose of ensuring safety and quality of sprouts. This code should be used in conjunction with the TZS 109: Food processing units — Code of hygiene — General and TZS 1743: National Standard Good Agricultural Practices (GAP) and Good Handling Practices (GHP) for fresh fruits and vegetables. In the preparation of this code assistance was derived from CAC/RCP 53-2003 published by the Codex Alimentarius Commission

1 Scope

This Tanzania Standard covers the hygienic practices that are specific for the primary production of seeds for sprouting and the production of safe and quality sprouts for human consumption.

2 Normative references

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.

TZS 109, *Food processing units - Code of hygiene — General*

TZS 538, *Packaging and labelling of foods*

TZS 1743, *National Standard Good Agricultural Practices (GAP) and Good Handling Practices (GHP) for fresh fruits and vegetables.*

3 Terms and definitions

For the purpose of this Standard, terms and definitions in the TZS 1743, National Standard Good Agricultural Practices and Good Handling Practices for fresh fruits and vegetables, and the following shall apply :

3.1 sprout

freshly germinated seeds of plants which can be eaten raw or processed

3.2 seed producer

any person directly responsible for the management of activities associated with the primary production of seeds including post-harvest practices

3.3 cultivation

any agricultural action or practice used by growers to allow and improve the growing conditions of fresh fruits or vegetables grown in the field (with or without cover) or in protected facilities (hydroponic systems, greenhouses)

3.4 farm

any premise or establishment in which sprouts and seeds for sprout production are grown and harvested where the surroundings are under the control of the same management

3.5 harvester

person directly responsible for the management of harvesting of sprouts and seeds for sprouts production

3.6 hazard

any biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect

3.7 micro-organisms

organisms which are too small to be visible to the naked eye including yeasts, moulds, bacteria, viruses and parasites

3.8 primary production

steps involved in the growing and harvesting of sprouts and seeds for sprouts production such as planting, irrigation, application of fertilizers, application of agricultural chemicals, etc.

3.9 seed distributor

any person directly responsible for the distribution of seeds (handling, storage and transportation) to sprout producers. Seed distributors may deal with single or multiple seed producers and can be producers themselves

3.10 sprout producer

any person directly responsible for the management of the activities associated with the production of sprouts

3.11 spent irrigation water

water that has been in contact with sprouts during the sprouting process

4 Primary production of seeds

Seeds for sprouts production are grown and harvested under a wide range of climatic and diverse geographical conditions, using various agricultural inputs and technologies, and on farms of varying sizes. Biological, chemical and physical hazards may therefore vary significantly from one type of production to another. In each primary production area, it is necessary to apply Good Agricultural Practices (GAP) that promote the production of safe seeds and sprouts, taking into account the conditions specific to the primary production area, type of products, and methods used. Procedures associated with primary production

should be conducted under good hygienic conditions and should minimize potential hazards to health due to the contamination of seeds and sprouts.

4.1 Environmental hygiene

Potential sources of contamination from the environment should be identified. In particular, primary production should not be carried out in areas where the presence of potentially harmful substances would lead to an unacceptable level of such substances in or on sprouts.

Growers should evaluate the previous uses of the sites (indoor and outdoor) as well as adjoining sites in order to identify potential microbial, chemical and physical hazards. The potential for other types of contamination (for example, from agricultural chemicals, hazardous wastes, etc.) should also be considered. The evaluation process should include the following:

- Previous and present usage of the primary production area and the adjoining sites (e.g. crop grown, feed lot, animal production, hazardous waste site, sewage treatment site, mining extraction site) to identify potential microbial hazards including faecal contamination and contamination by organic waste and potential environmental hazards that could be carried to the growing site.
- The access of farm and wild animals to the site and to water sources used in primary production to identify potential faecal contamination of the soils and water and the likelihood of contaminating crop. Existing practices should be reviewed to assess the prevalence and likelihood of uncontrolled deposits of animal faeces coming into contact with crops. Considering this potential source of contamination, efforts should be made to protect seed and sprouts production areas from animals. As far as possible, domestic and wild animal should be excluded from the area.
- Potential for contaminating produce fields from leaking, leaching or overflowing manure storage sites and flooding from polluted surface waters.

If previous uses cannot be identified, or the examination of the growing or adjoining sites leads to the conclusion that potential hazards exist, the sites should be analysed for contaminants of concern. If the contaminants are at excessive levels and corrective or preventative actions have not been taken to minimize potential hazards, the sites should not be used until correction/control measures are applied.

4.2 Hygienic production of seeds

4.2.1 *Manure and biosolids*

When seeds are destined for the production of sprouts for human consumption, wild or domestic animals should not be allowed to graze in the fields where seeds are grown. It is particularly important to prevent microbial contamination during the production of seeds which will be used to produce sprouts for human consumption because of the potential for pathogens to grow during the sprouting process. Consequently, manure, biosolids and other natural fertilizers should only be used when they have undergone treatments which achieve a high level of pathogen reduction.

4.2.2 *Agricultural chemicals*

Seed producers should only use chemicals (for example pesticides, desiccants) which are acceptable for seeds intended for the production of sprouts for human consumption.

4.2.3 *Equipment associated with growing and harvesting*

Prior to harvest, equipment should be adjusted to minimize soil intake and seed damage and should be free from any debris or earth.

4.3 Handling, storage and transportation

Seeds produced for the production of sprouts for human consumption should be segregated from product to be seeded or planted for animal feed (for example for forage or animal grazing) and clearly labelled.

Recognizing that seeds are vulnerable to microbial pathogens during threshing and drying, adequate care is needed to maintain sanitation in drying yards, and exposure of seeds to mist, high humidity and fog should be avoided.

4.4 Microbial analysis of seeds

Seed producers, distributors, and sprout producers should test lots of seeds for microbial pathogens using internationally accepted analytical methods. Sprouting seeds before testing increases the possibility of finding pathogens that may be present. If lots of seeds are found to be contaminated, diseased or damaged, which could be susceptible to microbial contamination should not be sold or used for the production of sprouts for human consumption. Because of the limitations associated with sampling methods and analytical tests, failure to find contamination does not guarantee that the seeds are pathogen free. However, if contamination is found at this stage, it allows seeds to be diverted or destroyed before entering sprout production for human consumption.

4.5 Seed recall

Seed producers should ensure that records and recall procedures are in place to effectively respond to health risk situations. Procedures should enable the complete and rapid recall of any implicated seed. The procedures should also assist in providing detailed information for the identification and investigation of any contaminated seeds and sprouts. The following should be adopted:

- Seed production and distribution practices should be in place to minimize the quantity of seed identified as a single lot and avoid the mixing of multiple lots that would complicate recalls and provide greater opportunity for cross-contamination. Seed producers and distributors and sprout producers should maintain records for each lot. The lot number, producer and country of origin should be indicated on each container.
- Seed producers should have a system to: effectively identify lots, trace the production sites and agricultural inputs associated with the lots, and allow physical retrieval of the seeds in case of a suspected hazard.
- Seeds which may present a hazard must be held and detained until they are disposed of properly.

5. Establishment for sprouts production

Attention to good hygienic design and construction, appropriate location, and the provision of adequate facilities, is necessary to enable hazards to be effectively controlled.

5.1 Location

Premises, equipment and facilities should be located, designed and constructed to ensure that:

- contamination is minimized;
- design and layout permit appropriate maintenance, cleaning and disinfections and minimize airborne contamination;

- surfaces and materials, in particular those in contact with sprouts, are non-toxic for intended use and, where necessary, suitably durable, and easy to maintain and clean;
- where appropriate, suitable facilities are available for temperature, humidity and other controls; and
- there is effective protection against pest access and harbourage.

5.2 Facilities

5.2.1 Water supply

An adequate supply of potable water with appropriate facilities for its storage, distribution and temperature control, should be available whenever necessary to ensure the safety and suitability of sprout.

Potable water should be as specified in the latest edition of WHO Guidelines for Drinking Water Quality, or water of a higher standard. Non-potable water (for use in, for example, fire control, steam production, refrigeration and other similar purposes where it would not contaminate food), shall have a separate system. Non-potable water systems shall be identified and shall not connect with, or allow reflux into, potable water systems.

5.2.2 Drainage and waste disposal

Adequate drainage and waste disposal systems and facilities should be provided. They should be designed and constructed so that the risk of contaminating sprouts or the potable water supply is avoided.

5.2.3 Cleaning

Adequate facilities, suitably designated, should be provided for cleaning food, utensils and equipment. Such facilities should have an adequate supply of hot and cold potable water where appropriate.

5.2.4 Personnel hygiene facilities and toilets

Personnel hygiene facilities should be available to ensure that an appropriate degree of personal hygiene is maintained and to avoid sprout contamination. Such facilities should be suitably located, designated and consider the following:

- adequate means of hygienically washing and drying hands, including wash basins and a supply of hot and cold (or suitably temperature controlled) clean running water;
- lavatories of appropriate hygienic design; and
- adequate changing facilities for personnel.

6 Control of operation

Growers should manage the risk of unsafe sprout by taking preventive measures to assure the safety and suitability of food at an appropriate stage in the operation.

6.1 Control of sprout hazards

Sprout business operators should control sprout hazards through the use of systems such as HACCP.

They should:

- identify any steps in their operations which are critical to the safety;
- implement effective control procedures at those steps;

- monitor control procedures to ensure their continuing effectiveness; and
- review control procedures periodically, and whenever the operations change.

These systems should be applied throughout the food chain to control food hygiene throughout the shelf life of the sprout through proper product and process design.

Control procedures may be simple, such as checking stock rotation calibrating equipment, or correctly loading refrigerated display units. In some cases a system based on expert advice, and involving documentation, may be appropriate.

6.2 Key aspects of hygiene control systems

6.2.1 Specific process steps in sprout production

6.2.1.1 Water for sprout production

Water quality management will vary throughout all operations. Sprout producers should follow Good Manufacturing Practices (GMPs) to minimize the potential for the introduction or spread of pathogens in processing water. The quality of water used should be dependent on the stage of the operation. Because of the potential for pathogen proliferation during the sprouting process, clean water could be used for initial washing stages, whereas water used later in the sprout production process (i.e. for the rinse following the microbiological decontamination of seed, and subsequent operations) should be preferably of potable quality or at least clean water.

6.2.1.2 Initial rinse

The seeds should be rinsed thoroughly before the microbiological decontamination treatment to remove dirt and increase the efficiency of this treatment. Seeds should be rinsed and thoroughly agitated in large volumes of clean water, in such a way to maximize surface contact. The process should be repeated until most of the dirt is removed and rinse water remains clear.

6.2.1.3 Microbiological disinfection of seeds

Due to the difficulty of obtaining seeds which can be guaranteed as pathogen free, it is recommended that seeds be treated prior to the sprouting process. Although there are other options like the use of lactic acid bacteria, liquid microbiological disinfection treatment is generally used. During this treatment sprout producers should adhere to the following:

- All containers used for microbiological disinfection of seeds should be cleaned and disinfected prior to use.
- Seeds should be well agitated in large volumes of antimicrobial agent to maximize surface contact.
- The duration of treatment and the concentration of antimicrobial agent used should be accurately measured and recorded.
- Strict measures should be in place to prevent re-contamination of seeds after the microbiological decontamination treatment.
- Antimicrobial agent should be used according to manufacturer's instructions for their intended use.

6.2.1.4 Rinse after seed treatment (disinfection)

As appropriate, seeds should be thoroughly rinsed after the microbiological decontamination treatment with potable water or at least clean water. Rinsing should be repeated sufficiently to eliminate antimicrobial agent.

6.2.1.5 Pre-germination soak

Soaking is often necessary to improve germination. When soaking, the sprout producer should adhere to the following:

- All containers used for soaking should be cleaned and disinfected prior to use.
- Seeds should be soaked in cleaned water for the shortest possible time to minimize microbial growth.
- This step may also employ antimicrobial agents.
- After soaking, seeds should be rinsed thoroughly with potable water or at least clean water.

6.2.1.6 Germination

During germination, keep the environment and equipment clean to avoid potential contamination. All equipment should be cleaned and disinfected before each new batch. Only potable water should be used. Where necessary and when used, soils or other matrices should be treated (e.g., pasteurized) to achieve a high degree of microbial reduction.

6.2.1.7 Harvesting

All equipment should be cleaned and disinfected before each new batch. Harvesting should be done with cleaned and disinfected tools dedicated for this use.

6.2.1.8 Final rinse and cooling

A final water rinse will remove hulls, cool product, and may reduce microbial contamination on sprouts.

The following should be adopted:

- As appropriate, sprouts should be rinsed in cold potable water to lower sprout temperature and slow down microbial growth.
- Water should be changed, as needed (for example between batches), to prevent cross-contamination.
- Sprouts should be drained using appropriate equipment (for example food grade centrifugal dryers) that is clean and disinfected prior to use.
- If additional cooling time is necessary, steps should be taken to facilitate rapid cooling (for example placed in smaller containers with adequate air flow between containers).

6.2.1.9 Storage of finished product

Where appropriate, sprouts should be kept under cold temperature around 5°C that will minimize microbial growth for the intended shelf life of the product. Regular and effective monitoring of temperature of storage areas and transport vehicles should be carried out.

6.2.2 Microbiological and other specifications

It is recommended that seed and sprouts or spent irrigation water be tested for the presence of pathogens.

6.2.2.1 Testing of seed lots before entering production

It is recommended that each new lot of seeds received at the sprouting facility is tested before entering production (i.e. before the microbiological decontamination of seeds). The seed sample selected for testing should be sprouted prior to analysis to increase the potential to detect pathogens if present. Analysis may be performed on the sprouted seeds or the water used to sprout the sample. Seed samples for microbial analysis should not be subject to any microbiological decontamination treatment at the sprouting facility.

6.2.2.2 Testing of sprouts and/or spent irrigation water

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Producers should have in place a sampling/testing plan to regularly monitor for pathogens at one or more stages after the start of germination. This is because current seed treatments cannot guarantee total elimination of pathogens. Further, if even a few pathogens survive the microbiological decontamination treatment, they can grow to high numbers during sprouting.

Analyses can be performed during the germination process (for example spent irrigation water or sprouts) and/or finished product may be analysed after harvest. Testing spent irrigation water is a good indicator of microbial conditions of sprouts. It is homogeneous and is simpler to analyse. Further, sampling spent irrigation water (or sprouts) during germination allows earlier results compared to testing finished product. Because of the sporadic nature of seed contamination, it is recommended that producers test every production lot.

6.2.3 Microbiological cross-contamination

Sprout producers should adhere to the traffic pattern of employees to prevent cross-contamination of sprouts. For example: the employees should avoid going back and forth to various areas of production. The employees should not go from a potentially contaminated area to the germination and/or packaging area unless they have washed their hands and changed to clean protective clothing.

6.3 Incoming material requirements

6.3.1 Specifications for incoming seeds

- Sprout producers should obtain seeds produced under Good Agricultural Practices and ensure that seed producers provide evidence that the product was grown according to clause 3 of this Tanzania Standard and the TZS 1743, National Standard Good Agricultural Practices (GAP) and Good Handling Practices (GHP) for fresh fruits and vegetables..
- Seed and sprout producers should obtain assurance from seed producers or distributors that chemical residues of each incoming lot are within the limits established by the Codex Alimentarius Commission and, where appropriate, they should obtain certificates of analysis for microbial pathogens of concern.

6.3.2 Control of incoming seeds

Seed containers should be examined at their arrival to minimize the potential for introducing obvious contaminants in the establishment. Seed containers should be examined for physical damage (for example holes from rodents) and signs of contamination (for example stains, rodent, insects, faeces, urine, foreign material, etc.). If found to be damaged, contaminated or potentially contaminated, its contents should not be used for the production of sprouts for human consumption. If seed lots are analysed for the presence of microbial pathogens of concern, these should not be used until results of analyses are available.

6.3.3 Seed storage

Seeds should be handled and stored in a manner that will prevent damage and contamination. Seeds should be stored off the floor, away from walls and in proper storage conditions to prevent mould and bacterial growth and facilitate pest control inspection. Open containers should be stored in such a way that they are protected from pests and other sources of contamination.

6.4 Documentation and records

Written records that accurately reflect product information and operational controls should be available to demonstrate the adequacy of the production activities.

- Upon receipt of seeds, records should be maintained of the seed supplier, the lot number and the country of origin to facilitate recall procedures.
- Records should be legible, permanent and accurate.
- Records should include written procedures, controls, limits, monitoring results and subsequent follow-up documents. Records must include: seed sources and lot numbers, water analysis results, sanitation checks, pest control monitoring, sprout lot codes, analysis results, production volumes, storage temperature monitoring, and product distribution and consumer complaints.
- Records should be kept long enough to facilitate recalls and food borne illness investigation, if required. This period will likely be much longer than the shelf life of the product.

6.5 Traceability

The traceability should be designed and implemented to enable the withdrawal of the products, where necessary. Detailed records should be kept that link each supplier of the product with the immediate subsequent recipient of the sprouts throughout the food chain. The information needed to link each supplier should include, if available, the packer name, address, and phone number, date packed, date released, type of sprout including brand name, lot identification and number of lots, and transporter.

The following are examples of the types of records that should be retained to facilitate traceability: -Shipping documents

- Invoices
- Other records maintained by the firm that identifies the supplier and the buyer
- Operators such as growers and producers and, in cases where contract harvesters are used, harvesters should keep current all relevant information on agricultural activities such as information concerning each lot, date harvested, grower contact information, harvest practices, if water used in harvesting, water quality.

6.6 Sprout recall

In the event of a foodborne illness outbreak associated with sprout, maintaining appropriate records of production, processing, packaging and distribution may help to identify the source of contamination in the sprout food chain and facilitate product recalls. Growers/packers/processors/distributors should consider developing and maintaining a recall procedure. The recall procedure should be designed and implemented accordingly to enable the withdrawal of the products, where necessary.

7 Establishment: Maintenance and sanitation

To facilitate the continuing effective control of sprout hazards, pests, and other agents likely to contaminate sprout establishment should have effective systems to:

- ensure adequate and appropriate maintenance and cleaning;
- control pests;
- manage waste; and
- monitor effectiveness of maintenance and sanitation procedures.

7.1 Maintenance and cleaning

7.1.1 General

Establishments and equipment should be kept in an appropriate state of repair and condition to:

- facilitate all sanitation procedures;
- function as intended, particularly at critical steps (see clause 5.1);
- prevent contamination of sprouts, for example from metal shards, flaking plaster, debris and chemicals.

Cleaning should remove food residues and dirt which may be a source of contamination. Disinfection may be necessary after cleaning.

Cleaning chemicals should be handled and used carefully and in accordance with manufacturers' instructions and stored, where necessary, separated from food, in clearly identified containers to avoid the risk of contaminating food.

7.1.2 Cleaning procedures and methods

Cleaning can be carried out by the separate or the combined use of physical methods, such as heat, scrubbing, turbulent flow, vacuum cleaning or other methods that avoid the use of water, and chemical methods using detergents, alkalis or acids.

Cleaning procedures will involve, where appropriate:

- removing gross debris from surfaces;
- applying a detergent solution to loosen soil and bacterial film and hold them in solution or suspension;
- rinsing with water which complies with clause 4.2.1, to remove loosened soil and residues of detergent;
- dry cleaning or other appropriate methods for removing and collecting residues and debris; and
- where necessary, disinfection with subsequent rinsing unless the manufacturers' instructions indicate on scientific basis that rinsing is not required.

7.2 Cleaning programmes

Cleaning and disinfection programmes should ensure that all parts of the establishment are appropriately clean, and should include the cleaning of cleaning equipment.

Cleaning and disinfection programmes should be continually and effectively monitored for their suitability and effectiveness and where necessary, documented.

Where written cleaning programmes are used, they should specify:

- areas, items of equipment and utensils to be cleaned;
- responsibility for particular tasks;
- method and frequency of cleaning; and
- monitoring arrangements.

Programmes should be drawn up in consultation with relevant specialists.

7.3 Pest control systems

7.3.1 General

Pests pose a major threat to the safety and suitability of food. Pest infestations can occur where there are breeding sites and a supply of food. Good hygiene practices should be employed to avoid creating an environment conducive to pests. Good sanitation, inspection of incoming materials and good monitoring can minimize the likelihood of infestation and thereby limit the need for pesticides.

7.3.2 Preventing access

Buildings should be kept in good repair and condition to prevent pest access and to eliminate potential breeding sites. Holes, drains and other places where pests are likely to gain access should be kept sealed. Wire mesh screens, for example on open windows, doors and ventilators, will reduce the problem of pest entry. Animals should, wherever possible, be excluded from the grounds of factories and food processing plants.

7.3.3 Harbourage and infestation

The availability of food and water encourages pest harbourage and infestation. Potential food sources should be stored in pest-proof containers and/or stacked above the ground and away from walls. Areas both inside and outside food premises should be kept clean. Where appropriate, refuse should be stored in covered, pest-proof containers.

7.3.4 Monitoring and detection

Establishments and surrounding areas should be regularly examined for evidence of infestation.

7.3.5 Eradication

Pest infestations should be dealt with immediately and without adversely affecting food safety or suitability. Treatment with chemical, physical or biological agents should be carried out without posing a threat to the safety or suitability of food.

7.4 Waste management

Suitable provision must be made for the removal and storage of waste. Waste must not be allowed to accumulate in food handling, food storage, and other working areas and the adjoining environment except so far as is unavoidable for the proper functioning of the business. Waste stores must be kept appropriately clean.

7.5 Monitoring effectiveness

Sanitation systems should be monitored for effectiveness, periodically verified by means such as audit pre-operational inspections or, where appropriate, microbiological sampling of environment and food contact surfaces and regularly reviewed and adapted to reflect changed circumstances.

8 Establishment: Personal hygiene

People who do not maintain an appropriate degree of personal cleanliness, who have certain illnesses or conditions or who behave inappropriately, can contaminate food and transmit illness to consumers. Ensure that those who come directly or indirectly into contact with food are not likely to contaminate food by:

- maintaining an appropriate degree of personal cleanliness; and
- behaving and operating in an appropriate manner.

8.1 Health status

People known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food, should not be allowed to enter any food handling area if there is a likelihood of them contaminating food. Any person so affected should immediately report illness or symptoms of illness to the management. Medical examination of a food handler should be carried out if clinically or epidemiologically indicated.

8.2 Illness and injuries

Conditions which should be reported to management so that any need for medical examination and/or possible exclusion from food handling can be considered, include jaundice, diarrhea, vomiting, fever, sore throat with fever, visibly infected skin lesions (boils, cuts, etc.) and discharges from the ear, eye or nose.

8.3 Personnel cleanliness

Sprout handlers should maintain a high degree of personal cleanliness and, where appropriate, wear suitable protective clothing, head covering, and footwear. Cuts and wounds, where personnel are permitted to continue working, should be covered by suitable waterproof dressings.

Personal cleanliness may affect sprout safety. Therefore personnel should always wash their hands, for example: at the start of food handling activities; immediately after using the toilet; and after handling raw food or any contaminated material, where this could result in contamination of other food items; they should avoid handling ready-to-eat food, where appropriate etc.

8.4 Personal behaviour

People engaged in food handling activities should refrain from behaviour which could result in contamination of food, for example: smoking; spitting; chewing or eating; sneezing or coughing over unprotected food. Personal effects such as jewellery, watches, pins or other items should not be worn or brought into food handling areas if they pose a threat to the safety and suitability of food.

8.5 Visitors

Visitors to sprout growing, processing or handling areas should, where appropriate, wear protective clothing and adhere to the other personal hygiene provisions in clause 7.

9 Transportation

Sprout may become contaminated, or may not reach its destination in a suitable condition for consumption, unless effective control measures are taken during transport, even where adequate hygiene control measures have been taken earlier in the food chain. Measures should be taken in order to:

- protect sprout from potential sources of contamination;
- protect sprout from damage likely to render the food unsuitable for consumption; and
- provide an environment which effectively controls the growth of pathogenic or spoilage micro-organisms and the production of toxins in food.

The design of the sprout transportation unit should be such as to avoid cross contamination due to simultaneous or consecutive transport. There should be appropriate facilities conveniently available for cleaning and, where appropriate disinfecting of the food transportation unit.

10 Product information and consumer awareness

10.1 Product information

Insufficient product information, and/or inadequate knowledge of general food hygiene, can lead to products being mishandled at later stages in the food chain. Such mishandling can result in illnesses, or products becoming unsuitable for consumption, even where adequate hygiene control measures have been taken earlier in the food chain.

Products should bear appropriate information to ensure that:

- adequate and accessible information is available to the next person in the food chain to enable them to handle, store, process, prepare and display the product safely and correctly;
- the lot or batch can be easily identified and recalled if necessary.

10.2 Marking and labelling

Prepackaged sprouts should be labelled with clear instructions. Each package should bear the following particulars legibly and indelibly marked. In addition to the provisions covered by this Standard, sprouts should also be packed in according with TZS 1003 and TZS 538 (see clause 2).

- Name and address of the packer and/or dispatcher
- Name of the produce by common name; including variety/cultivar
- Origin of the produce – Name of the producing country, region and district where grown
- Commercial specification, i.e. type, class, size expressed as minimum and maximum diameter
- Net weight
- Batch number
- Brand or trade mark, if any

10.3 Consumer education

Health education programmes should cover general food hygiene. Such programmes should enable consumers to understand the importance of any product information and to follow any instructions accompanying products, and make informed choices. In particular consumers should be informed of the relationship between time/temperature control and foodborne illnesses. Consumer should prevent contamination and growth or survival of food borne pathogens by storing, preparing and using it correctly.

All stakeholders in the sprout value chain including government, industry, consumer organizations and the media should work together to communicate clear consistent messages on handling sprout safely to avoid giving contradictory advice and causing confusion.

Consumer information on handling sprout safely should cover:

- Avoiding the selection of sprout with damaged or rotten areas.
- Transportation to home; increase in product temperature during transportation can be considerable. Time in transit for sprout between retail/market and the home should be kept as short as possible.
- Storage/ refrigeration of sprout; sprout should preferably be stored in a cool environment. All prepackaged sprout should be refrigerated as soon as possible.
- Once removed from the refrigerator, sprout should be consumed as soon as possible.
- Wash sprout using potable running water and where appropriate, disinfect.
- Correct hand washing methods.

- Cross-contamination; consumers need to handle, prepare, and store sprout safely to avoid cross contamination with pathogens from various sources (e.g., hands, sinks, cutting boards, utensils, raw meats).

11 Training

Training is fundamentally important to any food hygiene system.

Inadequate hygiene training, and/or instruction and supervision of all people involved in food related activities pose a potential threat to the safety of food and its suitability for consumption.

Those engaged in food operations who come directly or indirectly into contact with food should be trained, and/or instructed in food hygiene to a level appropriate to the operations they are to perform.

11.1 Awareness and responsibilities

Food hygiene training is fundamentally important. All personnel should be aware of their role and responsibility in protecting food from contamination or deterioration. Food handlers should have the necessary knowledge and skills to enable them to handle food hygienically. Those who handle strong cleaning chemicals or other potentially hazardous chemicals should be instructed in safe handling techniques.

Personnel associated with packing should be aware of GMPs, Good Hygienic Practices (GHP) and their role and responsibility in protecting fresh fruits and vegetables from contamination or deterioration. Packers should have the necessary knowledge and skills to enable them to perform packing operations and to handle fresh fruits and vegetables in a way that minimizes the potential for microbial, chemical, or physical contamination.

All personnel who handle cleaning chemicals or other potentially hazardous chemicals should be instructed in safe handling techniques. They should be aware of their role and responsibility in protecting fresh fruit and vegetables from contamination during cleaning and maintenance.

Producer should have a written training programme that is routinely reviewed and updated. Systems should be in place to ensure that food handlers remain aware of all procedures necessary to maintain the safety of sprouts.

11.2 Training programmes

Personnel involved in primary production, packing, processing or transport operations of sprout should receive training appropriate to their tasks and should be periodically assessed while performing their duties to ensure tasks are being completed correctly. Training should be delivered in a language and manner to facilitate understanding of what is expected of them and why, and should emphasize the importance of using hygienic practices. A well-designed training programme considers the barriers to learning of the trainees and develops training methods and materials to overcome those barriers.

All agricultural workers should be trained in proper use of hygiene facilities. Training could include, for example, toilet use, proper disposal of toilet paper or equivalent, and proper hand washing and drying procedures.

The following training considerations should be addressed:

- Longstanding entrenched trainee behaviours, attitudes or personal beliefs
- Transient nature of workforce with no prior training in food safety and hygiene
- Concerns about children/infants who may accompany parents working in the production site with the potential for transfer of pathogens with a human reservoir
- Diverse cultural, social and traditional practices
- Literacy and education level
- Language and dialect of trainees

- Need to make food safety practices realistic and easy to implement (identify enabling factors, motivators and incentives)
- Raising awareness among trainees of the symptoms and signs of disease and encourage them to act upon it (taking personal responsibility for health)
- Risks associated with consumption of unsafe sprout

Training programmes should be repeated periodically, and updated whenever there is a change in the product, process or staff and monitored for effectiveness and modified when necessary.

Increased emphasis on training in cold chain logistics and management is recommended, in line with advancing knowledge and technologies for both refrigeration and temperature monitoring and expanding international trade.

11.3 Refresher training programmes

Training programmes should be routinely reviewed and updated where necessary. Systems should be in place to ensure that food handlers remain aware of all procedures necessary to maintain the safety and suitability of food.

11.4 Instruction and supervision

Periodic assessments of the effectiveness of training and instruction programmes should be made, as well as routine supervision and checks to ensure that procedures are being carried out effectively.

Managers and supervisors of food processes should have the necessary knowledge of food hygiene principles and practices to be able to judge potential risks and take the necessary action to remedy deficiencies.

DRAFT FOR STAKEHOLDERS' COMMENTS

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