CODE OF HYGIENIC PRACTICE FOR SPICES AND DRIED AROMATIC PLANTS

CAC/RCP 42 - 1995 [1]

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[1] The Code of Hygienic Practice for Spices and Dried Aromatic Plants was adopted by the Codex Alimentarius Commission at its 21st Session in 1995. The Code has been sent to all Member Nations and Associated Members of FAO and WHO as an advisory text, and it is for individual governments to decide what use they wish to make of it. The Commission has expressed the view that codes of practice might provide useful checklists of requirements for national food control or enforcement authorities.

CODE OF HYGIENIC PRACTICE FOR SPICES AND DRIED AROMATIC PLANTS

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Section I - SCOPE

This Code of Hygienic Practice applies to spices and dried aromatic plants -whole, broken, ground or blended. It covers the minimum requirements of hygiene for harvesting, post harvest technology (curing, bleaching, drying, cleaning, grading, packing, transportation and storage including microbial and insect disinfestation) processing establishment, processing technology (grinding, blending, freezing and freeze drying, etc.) packaging and storage of processed products.

Section II - DEFINITIONS

2.1 **Spices and Dried Aromatic Plants**

The term spices, which includes dried aromatic plants, relates to natural dried components or mixtures thereof, used in foods for flavouring, seasoning and imparting aroma. The term applies equally to spices in the whole, broken or ground form.

2.2 **Spice Blends and Products**

2.2.1 **Spice Blends**

Spice blends are obtained by mixing and grinding, cleaned, dried and sound selected spices.

Section III - HYGIENIC REQUIREMENTS IN THE PRODUCTION/HARVESTING AREA

3.1 **Environmental Hygiene in Areas where Raw Materials are Produced**

3.1.1. **Unsuitable Growing or Harvesting Areas**

Spices should not be grown or harvested where the presence of potentially harmful substances would lead to an unacceptable level of such substances in the final product.

3.1.2. **Protection from Contamination by Wastes**

3.1.2.1 Raw spices should be protected from contamination by human, animal, domestic, industrial and agricultural wastes which may be present at levels likely to be a hazard to health. Adequate precautions should be taken to ensure that these wastes are not used and are not disposed of in a manner which may constitute a

hazard to health through the food.

3.1.2.2 Arrangements for the disposal of domestic and industrial wastes in areas from which raw materials are derived should be acceptable to the official agency having jurisdiction.

3.1.3 Irrigation Control

Spices should not be grown or produced in areas where the water used for irrigation might constitute a hazard to health to the consumer through the spices.

3.1.4 Pest and Disease Control

Control measures involving treatment with chemical, physical or biological agents should only be undertaken under direct supervision of personnel who have a thorough knowledge of the potential hazards to health. Such measures should only be carried out in accordance with the recommendations of the Codex Alimentarius Commission or, where these do not exist, by the official agency having jurisdiction.

3.2 Drying (Curing)

Plants or parts of plants used for the preparation of spices may be dried naturally or artificially, provided adequate measures are taken to prevent contamination or alteration of the raw material during the process. To prevent the growth of microorganisms, especially mycotoxin producing mould, a safe moisture level should be achieved.

If dried naturally, plants or part of plants should not be in direct contact with the soil. They should be placed on raised platforms or on a floor made of a suitable material.

New concrete floors should be used for drying only when it is absolutely certain that the new concrete is well-cured and free of excess water. It is safer to use an approved plastic cover spread over the entire new concrete floor as a moisture barrier prior to use for spices.

Excessive heating/drying of material should be avoided in order to retain its aromatic principles. Suitable precautions should be taken to protect the spices from contamination by domestic animals, rodents, birds, mites and other arthropods or other objectionable substances during drying, handling and storage.

3.3 Cleaning

The spices should be cleaned properly to the desired levels prescribed in the national and international standards.

3.4 Packaging

Packaging should protect the clean, dried spices from contamination and the entry of water or excess moisture. In particular, the reabsorption of ambient moisture in humid tropical climates should be prevented. Contamination from mineral oils used for processing natural fibre bags should be prevented by the use of liners where appropriate. Reusable containers should be properly cleaned and disinfested before reuse.

3.5 **Transportation**

The conveyances for transporting the harvested, cleaned, dried and packed spices from the place of production to storage for processing should be cleaned and disinfested before loading. In addition, bulk transport such as ship or rail car should be cleaned and, as appropriate, well ventilated with dry air to remove moisture resulting from the respiration of spices, and to prevent moisture condensation as the vehicle moves from a warmer to a cooler region or from day to night.

Section IV - ESTABLISHMENT DESIGN AND FACILITIES

4.1 Location

Establishments should preferably be located in areas which are free from objectionable odours, smoke, dust or other contaminants and are not subject to flooding.

4.2 **Roadways and Areas used by Wheeled Traffic**

Such roadways and areas serving the establishment which are within its boundaries or in its immediate vicinity should have a hard paved surface suitable for wheeled traffic. There should be adequate drainage and provision should be made to allow for cleaning.

4.3 **Building and Facilities**

4.3.1 Buildings and facilities should be of sound construction and maintained in good repair. All construction materials should be such that they do not transmit any undesirable substances to food. All construction materials should be such, that when construction is completed, they do not emit toxic vapours.

4.3.2 Adequate working space should be provided to allow for satisfactory performance of all operations.

4.3.3 The design should be such as to permit easy and adequate cleaning and to facilitate proper supervision of food hygiene.

4.3.4 The buildings and facilities should be designed to prevent the entrance and harbouring of pests and the entry of environmental contaminants such as smoke, dust, etc.

4.3.5 Buildings and facilities should be designed to provide separation, by partition, location or other effective means, between those operations which may cause cross-contamination.

4.3.6 Buildings and facilities should be designed to facilitate hygienic operations by means of a regulated flow in the process from the arrival of the raw materials at the premises to the finished product, and should provide for appropriate temperature conditions for the process and the product.

4.3.7 **Spices handling areas**

4.3.7.1 **Floors** - Where appropriate, should be of water-proof, non-absorbent, washable, non-slip and non-toxic materials, without crevices, and should be easy to clean and disinfect. Where appropriate, floors

should slope sufficiently for liquids to drain to trapped outlets.

4.3.7.2 **Walls** - Where appropriate, should be of water-proof, non-absorbent and washable materials, sealed and free of insects and should be light coloured. Up to a height appropriate for the operation these should be smooth and without crevices, and should be easy to clean and disinfect. Where appropriate angles between walls, between walls and floors, and between walls and ceilings should be sealed and coved to facilitate cleaning.

4.3.7.3 **Ceilings** - should be so designed, constructed and finished as to prevent the accumulation of dirt and minimize condensation, mould development and flaking, and should be easy to clean.

4.3.7.4 **Windows and other openings** - should be so constructed as to avoid accumulation of dirt and those which open should be fitted with insect-proof screens. Screens should be easily movable for cleaning and kept in good repair. Internal window sills, if present, should be sloped to prevent use as shelves.

4.3.7.5 **Doors** - should have smooth, non-absorbent surfaces and where appropriate, be self-closing and close fitting.

4.3.7.6 **Stairs** - Lift cages and auxiliary structures such as platforms, ladders and chutes should be so situated and constructed as not to cause contamination to food. Chutes should be constructed with inspection and cleaning hatches.

4.3.8 **Overhead structures and fittings** - should be installed in such a manner as to avoid contamination of the finished product and raw materials by condensation and drip, and should not hamper cleaning operations. These should be insulated, where appropriate, and be so designed and finished as to prevent the accumulation of dirt and to minimize condensation, mould development and flaking. They should be easy to clean.

4.3.9 **Living quarters, toilets** and areas where animals are kept should be completely separated from and should not open directly on to spice handling areas.

4.3.10 Where appropriate, establishments should be so designed that access to various sections can be controlled.

4.3.11 The use of materials which cannot be adequately cleaned and disinfected, such as wood, should be avoided unless its use would clearly not be a source of contamination.

4.3.12 **Water Supply**

An ample supply of water, in compliance with section 7.3 of this Code, under adequate pressure and at suitable temperature should be available with appropriate facilities for its storage, where necessary, and distribution, and with proper protection against contamination.

Ice should be made from potable water; it should be manufactured, handled and stored so as to protect it from contamination.

Steam used in direct contact with food or surfaces in contact with food should contain no substances

which may be hazardous to health or contaminate the food.

Non-potable water - used for steam production, refrigeration, fire control and other similar purposes not connected with processing should be carried in completely separate lines, identifiable preferably by colour, and with no

cross-connection with or back siphonage into the system carrying potable water.

4.3.13 Effluent and Waste Disposal

Establishments should have an efficient effluent and waste disposal system which should at all times be maintained in good order and repair. All effluent lines (including sewer systems) should be large enough to carry peak loads and should be so constructed as to avoid contamination of potable water supplies.

4.3.14 Changing Facilities and Toilets

Adequate, suitable and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be so designed as to ensure hygienic removal of waste matter. These areas should be well lit, ventilated and, where appropriate, heated and should not open directly into the handling areas. Hand washing facilities with warm or hot and cold water, a suitable hand-cleaning preparation, and hygienic means of drying hands, should be provided adjacent to toilets and in such a position that the employee must pass them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided near to each washing facility. Taps of a non-hand operation type are desirable. Notices should be posted directing personnel to wash their hands after using the toilet.

4.3.15 Hand-washing Facilities in Processing Areas

Adequate and conveniently located facilities for hand washing and drying should be provided wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided. Warm or hot and cold water and a suitable hand cleaning preparation should be provided. Where hot and cold water are available mixing taps should be provided. There should be suitable hygienic means of drying hands. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided adjacent to each washing facility. Taps of a non-hand operated type are desirable. The facilities should be furnished with properly trapped waste pipes leading to drains.

4.3.16 Disinfection Facilities

Where appropriate, adequate facilities for cleaning and disinfection of working implements and equipment should be provided. These facilities should be constructed of corrosion-resistant materials, capable of being easily cleaned, and should be fitted with suitable means of supplying hot and cold water in sufficient quantities.

4.3.17 Lighting

Adequate natural or artificial lighting should be provided throughout the establishment. Where appropriate, the lighting should not alter colours and the intensity should not be less than:

540 lux (50 foot candles) at all inspection points

220 lux (20 foot candles) in work rooms

110 lux (10 foot candles) in other areas.

Light bulbs and fixtures suspended over food materials in any stage of production should be of a safety type and protected to prevent contamination of the material in case of breakage.

4.3.18 **Ventilation**

Adequate ventilation should be provided to prevent excessive heat, steam condensation and dust and to remove contaminated air. The direction of the air-flow within the plant should never be from a dirty area to a clean area. Ventilator openings should be provided with a screen or other protective enclosure of non-corrodible material. Screens should be easily removable for cleaning.

4.3.19 **Facilities for storage of waste and inedible material**

Facilities should be provided for the storage of waste and inedible material prior to removal from the establishment. These facilities should be designed to prevent access to waste or inedible material by pests and to avoid contamination of food, potable water, equipment and buildings or roadways on the premises.

4.4 **Equipment and utensils**

4.4.1 **Materials**

All equipment and utensils used in food handling areas and which may contact food should be made of materials which do not transmit toxic substances, odour or taste, is non-absorbent, is resistant to corrosion and is capable of withstanding repeated cleaning and disinfection. Surfaces should be smooth and free from pits and crevices. The use of wood and other materials which cannot be adequately cleaned and disinfected should be avoided except when their use would clearly not be a source of contamination. The use of different metals in such a way that contact corrosion can occur should be avoided.

4.4.2 **Sanitary design, construction and installation**

4.4.2.1 **All equipment and utensils** should be so designed and constructed as to prevent hygienic hazards and permit easy and thorough cleaning and disinfection and, where practicable, be visible for inspection. Stationary equipment should be installed in such a manner as to permit easy access and thorough cleaning.

4.4.2.2 **Containers for inedible materials or waste** should be leak-proof, constructed of metal or other suitable impervious materials, should be easy to clean or disposable and should close securely.

4.4.2.3 **All refrigerated spaces** should be equipped with temperature measurement or recording devices.

4.4.3 **Equipment identification**

Equipment and utensils used for inedible materials or waste should be identified and should not be used for edible products.

SECTION V - ESTABLISHMENT: HYGIENE REQUIREMENTS

5.1 Maintenance

The buildings, equipment, utensils and all other physical facilities of the establishment, including drains, should be maintained in an orderly condition. As far as practicable, rooms should be kept free from steam, vapour and surplus water.

5.2 Cleaning and Disinfection

5.2.1 Cleaning and disinfection should meet the requirements of this code. {For further information on cleaning and disinfection procedures, see Appendix I of the *Recommended International Code of Practice - General Principles of Food Hygiene* (Ref. No. CAC/RCP 1-1969, Rev. 2 - 1985)}.

5.2.2 To prevent contamination of spices, all equipment and utensils should be cleaned as frequently as necessary and disinfected whenever circumstances demand.

> Note: Equipment, utensils, etc. that are in contact with plants or parts of plants used in the preparation or processing of spices will be contaminated by microorganisms. There is an inherent risk of affecting other plants or spices that will be manipulated later. It is therefore necessary to clean the equipment and when appropriate, dismantle it at frequent intervals during the day, at least after each break and when changing from one food product to another. Dismantling, cleaning and disinfection at the end of the work day are aimed at preventing the proliferation of pathogenic flora. Control should be exercised through regular inspections.

5.2.3 Adequate precautions should be taken to prevent spices from being contaminated during cleaning or disinfection of rooms, equipment or utensils by water and detergents or by disinfectants and their solutions. Detergents and disinfectants should be suitable for the purpose intended and should be acceptable to the official agency having jurisdiction. Any residues of these agents on a surface which may come in contact with spices should be removed by rinsing with potable water or rinsing and drying with steam before the surface or equipment is again used for handling food.

5.2.4 Either immediately after cessation of work for the day or at such other times as may be appropriate, floors including drains and orifices for the evacuation of liquid wastes, auxiliary structures and walls of handling areas should be thoroughly cleaned.

5.2.5 Changing facilities and toilets should be kept clean at all times.

5.2.6 Roadways and yards in the immediate vicinity of and serving the premises should be kept clean.

5.3 Hygiene control programme

A permanent cleaning and disinfection schedule should be drawn up for each establishment to ensure that all areas are appropriately cleaned and that critical areas, equipment and materials are designated for special attention. A single individual, who should preferably be a permanent member of the staff of the establishment and whose duties preferably should be independent of production, should be appointed to be

responsible for the cleanliness of the establishment. He or she should have a thorough understanding of the significance of contamination and the hazards involved. All cleaning personnel should be well trained in cleaning techniques.

5.4 By-products

By-products such as trimmings, peelings, discards, etc. not classed as waste material and which may have some future use should be stored in a manner to avoid contamination of food. They should be removed from the work zones as often as necessary and at least daily.

5.5 Storage and disposal of waste

Waste material should be handled in such a way as to avoid contamination of food or potable water. Care should be taken to prevent access to waste by pests. Waste should be removed from the spice handling and other working areas as often as necessary and at least daily. Immediately after disposal of waste, receptacles used for storage and any equipment which has come into contact with the waste should be cleaned and disinfected. The waste storage area should also be cleaned and disinfected.

5.6 Exclusion of domestic animals

Animals that are uncontrolled or that could be a hazard to health should be excluded from establishments.

5.7 Pest Control

5.7.1 There should be an effective and continuous programme for the control of pests. Establishments and surrounding areas should be regularly examined for evidence of infestation.

5.7.2 Should pests gain entrance to the establishment, eradication measures should be instituted. Control measures involving treatment with chemical, physical or biological agents should only be undertaken by or under direct supervision of personnel who have a thorough understanding of the potential hazards to health resulting from residues retained in the product. Such measures should only be carried out in accordance with the recommendations of the official agency having jurisdiction.

5.7.3 Pesticides should only be used if other precautionary measures cannot be used effectively. Before pesticides are applied, care should be taken to safeguard all spices, equipment and utensils from contamination. After application, contaminated equipment and utensils should be thoroughly cleaned prior to being used again.

5.8 Storage of Hazardous Substances

5.8.1 Pesticides or other substances which may represent a hazard to health should be suitably labelled with a warning about their toxicity and use. They should be stored in locked rooms or cabinets used only for that purpose and dispensed and handled only by authorized and properly trained personnel or by persons under strict supervision of trained personnel. Extreme care should be taken to avoid contaminating foods.

5.8.2 Except when necessary for hygienic or processing purposes, no substance which could contaminate

food should be used or stored in spice handling areas.

5.9 Personal effects and clothing

Personal effects and clothing should not be left in spice handling areas.

SECTION VI - PERSONNEL HYGIENE AND HEALTH REQUIREMENTS

6.1 Hygiene Training

Managers of establishments should arrange for adequate and continuing training of workers in hygienic handling of spices and in personal hygiene so that they understand the precautions necessary to prevent contamination of food. Training should include relevant sections of this code.

6.2 Medical Examination

Persons who come in contact with the food in the course of their work should have a medical examination prior to their employment if the official agency having jurisdiction, acting on medical advice, considers that this is necessary because of epidemiological considerations, the nature of the food prepared in a particular establishment or the medical history of the prospective food handler. Medical examination of a food handler should also be carried out at other times when clinically or epidemiologically indicated.

6.3 Communicable Diseases

The management should take care to ensure that no person, while known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted through spices or while afflicted with infected wounds, skin infections, sores or with diarrhoea, is permitted to work in any spice handling area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating food with pathogenic micro-organisms. Any person so affected should immediately report to the management.

6.4 Injuries

Any person who has a cut or wound should not continue to handle the material until the injury is completely protected by a waterproof covering which is firmly secured, and which is conspicuous in colour. Adequate first-aid facilities should be provided for this purpose.

6.5 Washing of Hands

Any person working in a spice handling area should wash hands frequently and thoroughly with a suitable hand-cleaning preparation under running warm water which should be in accordance with the Sub-Section 7.3 of the *Recommended International Code of Practice - General Principles of Food Hygiene* (Ref. No. CAC/RCP 1-1969, Rev. 2-1985). Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material and wherever else necessary. After handling any material which might be capable of transmitting disease, hands should be washed and disinfected immediately. Notices requiring hand-washing should be displayed. There should be adequate supervision to ensure compliance with this requirement.

6.6 Personal Cleanliness

Every person engaged in a spice handling area should maintain a high degree of personal cleanliness while on duty, and should at all times while so engaged wear suitable protective clothing including head covering and footwear, all of which articles should be cleanable unless designed to be disposed of and should be maintained in a clean condition consistent with the nature of the work in which the person is engaged.

Aprons and similar items should be washed in an appropriate area. Where hands come into direct contact with spices, any jewellery should be removed from the hands. Personnel should not wear any insecure jewellery when engaged in spice handling.

6.7 Personal Behaviour

Any behaviour which could result in contamination of spices, such as eating, use of tobacco, chewing (e.g. gum, sticks, betel nuts, etc.) or unhygienic practices such as spitting, should be prohibited in handling areas.

6.8 Gloves and Other Protection Equipment

Gloves and other protection equipment such as masks, if used in the handling of spices, should be maintained in a sound, clean and sanitary condition. The wearing of gloves does not exempt the operator from having thoroughly washed hands.

6.9 Visitors

Precautions should be taken to regulate the entry of visitors to handling and processing areas to avoid contamination. These precautions may include the use of protective clothing. Visitors should observe the provisions recommended in Sub-Section 5.9, 6.3, 6.4 and 6.7 of this code.

6.10 Supervision

Responsibility for ensuring compliance by all personnel with the requirements of Sub-Sections 6.1 to 6.9 should be specifically allocated to competent supervisory personnel.

SECTION VII - ESTABLISHMENT: HYGIENIC PROCESSING REQUIREMENTS

7.1 Raw Material Requirements

7.1.1 Acceptance Criteria

Spices should not be accepted by the plant if they are known to contain parasites, microorganisms, decomposed, toxic, or extraneous substances which will not be reduced to acceptable levels by normal plant procedures, sorting or preparation. Particular care should be taken to avoid contamination.

Plants, parts of plants or spices suspected of being contaminated with animal or human faecal material should be rejected for human consumption. Special precautions must be taken to reject spices showing signs of insect damage or mould growth because of the danger of their containing mycotoxins such as

aflatoxins.

7.1.2. **Inspection and Sorting**

Raw materials should be inspected and sorted prior to processing and where necessary, laboratory tests should be conducted. This inspection may include:

- Visual inspection for foreign matter
- Organoleptic evaluation: odour, appearance, possibly taste
- Testing for microbiological or mycotoxin contamination: systematic monitoring for sensitive materials, periodic monitoring for less sensitive materials.

These tests should refer either to national regulations, international standards or recommendations, or established methods used in the industry.

7.1.3 **Treatment**

In order to control microbiological contamination or pest infestation, appropriate methods of treatment may be used in accordance with the regulations set by the official agency having jurisdiction. Whenever spices have been treated, the type of treatment must be stated explicitly in an accompanying certificate. For use of irradiation, consult the Code of Good Irradiation Practice for the Control of Pathogens and Other Microflora in Spices, Herbs and Other Vegetable Seasonings.[2]

7.1.4 **Storage**

Raw materials stored in the plant premises should be maintained under conditions that will protect them against contamination and infestation and minimize deterioration. Spices not scheduled for immediate use should be stored under conditions that prevent infestation and mould growth.

The warehouse should be of sound construction and well equipped so that it will provide suitable storage and adequate protection for spices. Any breaks or openings in the walls, floors, roof shall have been repaired. Any breaks or openings around doors, windows and ventilators should be repaired or screened. Screens should be used only in those areas of the building where moisture entry from precipitation cannot occur. The building should have sufficient ventilation to prevent accumulation of moisture. Provision should be made in existing storage or at the design stage in new storage for gas tightness to permit *in situ* fumigation of spices.

Areas with new concrete floors or walls should not be used for storage until it is absolutely certain that the new concrete is well-cured and free of excess water. It is safer to use an approved plastic cover spread over the entire new concrete floor as a moisture barrier prior to use for spices. However, other means of protecting the spices against moisture from "sweating" concrete can be used, such as stacking of containers on pallets. The plastic can be removed when the warehouse is emptied. This system will protect against

[2] Code of Good Irradiation Practice for the Control of Pathogens and Other Microflora in Spices, Herbs and Other Vegetable Seasonings (International Consultative Group on Food Irradiation (ICGFI) Document No. 5)

moulding of the spices due to the sweating of new concrete.

Products which affect the storage life, quality or flavour of spices should not be stored in the same room or compartment as spices. For example, such items as fruits, vegetables, fish, fertilizer, gasoline or lubricating oils, etc. should not be stored along with spices.

7.2 Prevention of Cross-Contamination

7.2.1 Effective measures should be taken to prevent contamination of uncontaminated spices by direct or indirect contact with material at earlier stages of the processing.

7.2.2 Persons handling raw materials or semi-processed products capable of contaminating the end-product should not come into contact with any end-product unless and until they discard all protective clothing worn by them during the handling of the said products and have changed into clean protective clothing.

7.2.3 If there is a likelihood of contamination, hands should be washed and disinfected thoroughly before handling products at different stages of processing.

7.2.4 Raw products that may present a hazard should be processed in separate rooms, or in areas physically separate from those where end-products are being prepared.

7.2.5 All equipment which has been in contact with raw or contaminated materials should be thoroughly cleaned and disinfected prior to being used for contact with end-product.

7.3 Use of Water

7.3.1 As a general principle only potable water, as defined in the latest edition of Vol. 1 of the WHO "Guidelines for Drinking Water Quality", should be used in food handling.

7.3.2 Non-potable water may be used with the acceptance of the official agency having jurisdiction for steam production, refrigeration, fire control and other similar purposes not connected with food. However, non-potable water may, with specific acceptance by the official agency having jurisdiction, be used in certain food handling areas provided this does not constitute a hazard to health.

7.3.3 Water re-circulated for re-use within an establishment should be treated and maintained in a condition so that no health hazard can result from its use. The treatment process should be kept under constant surveillance. Alternatively, re-circulated water which has received no further treatment may be used in conditions where its use would not constitute a health hazard and will not contaminate either the raw material or the end-product. Re-circulated water should have a separate distribution system which can be readily identified. The acceptance of the official agency having jurisdiction should be required for any treatment process and for the use of re-circulated water in any food process.

7.4 Processing

7.4.1 Processing should be supervised by technically competent personnel.

7.4.2 All steps in the production process, including packaging, should be performed without unnecessary

delay and under conditions which will prevent the possibility of contamination, deterioration or the development of pathogenic and spoilage micro-organisms.

7.4.3 Rough treatment of containers should be avoided to prevent the possibility of contamination of the processed product.

7.4.4 Methods of preservation and necessary controls should be such as to protect against contamination or development of a public health hazard and against deterioration within the limits of good commercial practice.

7.5 **Packaging**

7.5.1 All packaging material should be stored in a clean and sanitary manner. The material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits acceptable to the official agency having jurisdiction. The packaging material should be sound and should provide appropriate protection from contamination.

7.5.2 Containers should not have been used for any purpose which may lead to contamination of the product. Containers should be inspected immediately before use to ensure that they are in a satisfactory condition and where necessary cleaned and/or disinfected; when washed they should be well drained and dried before filling. Only packaging material required for immediate use should be kept in the packaging or filling area.

7.5.3 Packing should be done under hygienic conditions that preclude the introduction of contamination into the product.

7.6 **Storage of the End-Product**

7.6.1 Spices and their products should be stored at a moisture low enough so that the product can be held under normal storage conditions without development of mould or significant deterioration by oxidative or enzymatic changes. An environment with a relative humidity between 55 and 60 percent should be maintained to protect quality and prevent mould growth. Where this is not practicable, spices should be packed in water-proof and gas-proof containers and stored in a proper warehouse.

7.6.2 Finished products may be packed in gas tight containers preferably under inert gases like nitrogen, etc., or under vacuum in order to protect quality and retard possible mould growth.

7.6.3 All products should be stored in clean, dry buildings, protected from insects, mites and other arthropods, rodents, birds, or other pests, chemical or microbiological contaminants, debris and dust.

7.6.4 **Control of Infestation by Insects, Mites and Other Aarthropods**

Spices should be stored in such a manner that infestation can be controlled by such methods as anaerobic or refrigerated storage or fumigation prior to storage. Stored spices should be inspected regularly and, if infested, fumigated by appropriate methods. If necessary, affected spices may be removed for fumigation. In this case, the storage areas should be cleaned and disinfected separately.

7.7 **Transport of the End-Product**

Spice products should be stored and transported under conditions that maintain the integrity of the container and the product within it. Carriers should be clean, dry, weatherproof, free from infestation and sealed to prevent water, rodents or insects from reaching the products. Spice products should be loaded, transported and unloaded in a manner that protects them from any damage or water. Well insulated carriers or refrigerated vehicles are recommended for transport when climatic conditions indicate such a need. Extreme care should be taken to prevent condensation when unloading spice products from a refrigerated vehicle or while taking out of a cold storage. In warm, humid weather, the spices should be allowed to reach ambient temperature before exposure to external conditions; this may require 1-3 days. Spices that have been spilled are vulnerable to contamination and should not be used as food.

7.8 **Sampling and Laboratory Control Procedures**

7.8.1 Laboratory procedures used should preferably follow recognized or standard methods in order that the results may be readily reproduced.

7.8.2 In addition to any control by the official agency having jurisdiction, it is desirable that each production plant should have its own or contracted laboratory control of the hygienic quality of the spice products processed and of the pest control procedures. The amount and type of such control will vary with the different spice products as well as the needs of management. Such control should provide for monitoring of the quality of the finished products and rejection of all spices that are unfit for human consumption.

SECTION VIII - END-PRODUCT SPECIFICATIONS

8.1 When tested by appropriate methods of sampling and examination, the products:

(a) should be free from pathogenic micro-organisms in levels that may represent a hazard to health; and

(b) should not contain any substances originating from micro-organisms, particularly aflatoxins, in amounts that exceed the tolerances or criteria established by the Codex Alimentarius Commission or, where these do not exist, by the official agency having jurisdiction

(c) should not contain levels of insect, bird or rodent contamination that indicate that spices have been prepared, packed or held under unsanitary conditions

(d) should not contain residues resulting from the treatment of spices in excess of levels established by the Codex Alimentarius Commission or, where these do not exist, by the official agency having jurisdiction

(e) should comply with the provisions for food additives, contaminants, and with maximum levels for pesticide residues established by the Codex Alimentarius Commission or, where these do not exist, by the official agency having jurisdiction.

8.2 Microbiological Criteria

Treated, ready-to-eat spices shall be free from Salmonella when ten samples of 25 g are analyzed by appropriate methods of examination (n=10, c=0).