

PHILIPPINE NATIONAL STANDARD

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Code of Hygienic Practice for Natural Ingredients



BUREAU OF PHILIPPINE STANDARDS (BPS)

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- International Organization for Standardization (ISO)
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Foreword

The Bureau of Agriculture and Fisheries Standards (BAFS) in cooperation with the Department of Agriculture Biotechnology Project Implementation Unit (DA Biotech PIU) and the Biotechnology Coalition of the Philippines (BCP) embarked on a project entitled “Development of Philippine National Standards and Code of Hygienic Practice for Selected Natural Ingredient”. The project aimed to support the development of the natural ingredients industry by promoting the standards for natural ingredients.

Global market for ingredients has been forecasted to reach a total value of US \$ 18 Billion¹ in 2013. The Philippines as the 7th most biologically diverse countries in the world has a great potential to develop the industry for natural ingredients in the field of food supplements, nutraceuticals, personal care, and other purposes.

Natural Ingredients are defined as those derived and/or extracted directly from plants, animals, minerals and marines that are minimally processed as opposed to being produced synthetically. However, these natural ingredients should not be misunderstood to mean ‘organic/organically grown’ since the latter follows a defined set of standards that sets limitations on use of synthetic inputs and other norms.

The Philippine National Standard (PNS) Code of Hygienic Practice (COHP) for Natural Ingredients have been prepared for the purpose of providing a uniform approach during the production, primary processing, handling and postharvest operations, recordkeeping, packaging and labelling of the products. It is hoped that this PNS accomplishes the goal of protecting consumer health and facilitate global competitiveness of the Natural Ingredients Industry.

¹ Department of Agriculture Biotechnology Program. 2010. Capitalizing on the Global Demand for Philippine Natural Ingredients.

Introduction

Natural ingredients can be consumed directly as food or traditional medicine, or further processed in the form of food supplements and other personal care products. Effective hygiene control is vital to avoid any adverse human health and economic consequences of food borne illnesses arising from the consumption of the product. As such, everyone, including farmers and growers, manufacturers and processors, food handlers and consumers, have the responsibility to ensure that food and natural materials are safe and suitable for consumption.

This Philippine National Standard Code of Hygienic Practice for Natural Ingredients lays a firm foundation for ensuring that principles of food hygiene are followed and should be used in conjunction with relevant Codex texts/standards. The controls described in this COHP are harmonized with international standards and are essential to ensure the safety and suitability of the natural ingredients.

Section 1 - OBJECTIVES

This Code of Hygienic Practice addresses essential principles of food hygiene that will help minimize contamination, including microbiological, chemical and physical hazards, associated with all stages of postharvest handling and primary processing of natural ingredients from primary production to consumer use.

Section 2 - SCOPE, USE AND DEFINITION

2.1 Scope

The Code of Hygienic Practice for Natural Ingredients covers the minimum safety and quality requirements for collecting, growing, harvesting and post-harvest practices (e.g. cutting, drying, cleaning, sorting and grading, packing, transporting and storing, including disinfestation), processing establishment, processing technology and practices (e.g. extraction), packaging and storage of natural ingredients products intended for further processing (semi/fully processed).

2.2 Use

This Code follows the format of the General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4 2003) and should be used in conjunction with it and other applicable Codes.

This Code is a recommendation for producers to adhere to, as far as possible, taking into account the local conditions while ensuring the safety and quality of their products in all circumstances. Flexibility in the application of certain requirements of the primary production of natural ingredients can be exercised, where necessary, provided that the product will be subjected to control measures sufficient to obtain a safe product.

2.3 Definition

For purposes of this Code, the following terms are operationally defined:

2.3.1

collection

refers to the act of gathering raw materials from the wild for use as source of natural ingredients

2.3.2

extraction

involves the separation of medicinally active portions of plant, animal or marine tissues and minerals from the inactive or inert components by using selective solvents in standard extraction procedures. The products so obtained are relatively impure liquids, semisolids or powders intended only for oral or external use

2.3.3

grower/agricultural worker

refers to any person that undertakes one or more of the following: collection, cultivation, harvesting and packing of natural ingredients

2.3.4

harvesting

is the operation of gathering the useful part(s) of the cultivated plants, reared animals, and cultured marines

2.3.5

lot or batch number

is a specific code indicating food produced during a period of time and under more or less the same manufacturing conditions

2.3.6

material sources are raw plants, animals, marines, and minerals from which the natural ingredients are derived

2.3.7

minimal processing

are those traditional processes used to make food edible or preserve it or make it safe for human consumption (e.g. smoking, roasting, freezing, drying and fermenting), or those physical processes which do not fundamentally alter the raw product and/or which only separate a whole, intact food into component parts (e.g. grinding, pressing, etc.)

2.3.8

natural ingredients

are components derived and/or extracted directly from plants, animals, marines, and minerals that are minimally processed as opposed to being produced synthetically

2.3.9

natural products

are products derived from plant, animal or microbial sources, primarily through physical processing, sometimes facilitated by simple chemical reactions such as acidification, basification, ion exchange, hydrolysis, and salt formation as well as microbial fermentation

2.3.10

organic produce

means any agricultural produce that is produced and certified according to the organic agriculture standards or gathered from nature, and/or handled with post-harvest management

2.3.11

organic product

means products from the organic agriculture certified produce that have been processed for the use as food or feed

2.3.12

processing

refers to any action that substantially alters the initial raw materials or products or ingredients including, but not limited to, heating, smoking, curing, maturing, drying, marinating, extraction, extrusion and a combination of those processes intended to produce food

2.3.13

primary production

refers to the production, rearing or growing of primary products including harvesting, milking and farmed animal production up to slaughter; and the rearing and growing of fish and other seafood in aquaculture ponds. It also includes fishing, and the hunting and catching of wild products

Section 3 - PRIMARY PRODUCTION

3.1 Hygienic Production of Natural Ingredients

Material sources of natural ingredients should be collected, grown, cultivated, harvested, and cleaned of dirt and foreign matter in accordance with good production practices.

Arrangements for the disposal of domestic and industrial wastes in areas from which raw materials are derived should meet the requirements set by the regulatory authorities.

Collection practices should ensure the long-term survival of wild populations and their associated habitats. Management plans for collection should provide a framework for setting sustainable harvest levels and describe appropriate collection practices that are suitable for each material source species and parts used.

3.1.1 Personnel Health, Hygiene and Sanitary Facilities

Production stages of material sources of natural ingredients should conform to national and/or regional statutory and regulatory requirements on safety, materials handling, and sanitation and hygiene.

All growers/agricultural workers should maintain proper personal hygiene and should be trained regarding company policies on their sanitation and hygiene responsibilities.

Where appropriate, each business engaged in production operations should have written procedures that relate to health, hygiene and sanitation. The written procedures should address workers training, facilities, and supplies to practice proper sanitation and hygiene.

All growers/agricultural workers should be protected from contact with potentially allergenic natural ingredients by means of adequate protective clothing, including gloves.

Unauthorized persons, casual visitors and, to the extent possible, children, should not be allowed from entering the harvest area as they may present an increased risk of contamination. When such persons are present, care should be taken to ensure they do not become a source of contamination.

3.1.2 Personnel Hygiene and Sanitary Facilities

Provide areas away from the field and packing areas for taking breaks and eating. These areas should provide access to changing facilities, clean toilet, hand washing and drying facilities so growers/agricultural workers can practice proper hygiene.

Sanitary facilities should be suitable and conveniently located in the work area, encouraging their use and reduce the likelihood that growers/agricultural workers will relieve themselves in the field.

Portable toilet facilities (if used) should not be located or cleaned in primary production areas or near irrigation water sources or conveyance systems. Growers/agricultural workers should identify the areas where it is safe to put portable facilities and to prevent traffic in case of a spill.

Sanitary facilities should include clean running water, soap, toilet paper or equivalent, single use paper towels or equivalent. Hand sanitizers should not replace hand washing and should only be used only after hands have been washed.

If clean running water is not available then there should be an acceptable alternative hand washing method.

Sanitary facilities should be sufficient in relation to the number of workers.

Sewerage and waste disposal system should be maintained properly and accordingly to minimize the risk of contaminating the production area and water sources with chemical and microbial hazards.

3.1.3 Personal Cleanliness

Personnel who handle material sources of natural ingredients should follow personal cleanliness and, where appropriate, wear suitable protective clothing (e.g. gloves, mask, head covers, etc.).

Personnel who handle material sources of natural ingredients should refrain from activities that could pose a risk of contamination (e.g. smoking, spitting, sneezing, coughing, etc.).

Personnel handling natural ingredients are not allowed to wear jewelry, watches, and other items of the same kind within the production and processing areas as it will be a risk to the safety and quality of the materials.

Personnel should properly wash their hands using soap and clean running water, followed by thorough drying, before handling material sources of natural ingredients, particularly during harvesting and post-harvest handling. Visuals or hand washing procedures should be posted in strategic locations.

Personnel known or suspected to be suffering from communicable disease should not be allowed to enter the handling areas if there is a likelihood of contaminating the products. Personnel should be encouraged to immediately report illness or symptoms of illness to the management.

3.2 Handling, Storage and Transport

Each material source should be harvested/collected during the optimal season or time period to ensure production of materials of the best possible quality and maximum yield. The best time for harvesting/collecting should be determined according to the quality and quantity of biologically active constituents rather than the total material yield of the targeted parts of natural ingredients. The concentration of the biologically active constituents varies with the stage of material source growth and development.

Appropriate harvesting method should be employed to minimize damage and the introduction of contaminants.

Material sources of natural ingredients should be harvested under the best possible condition, avoiding adverse temperatures, dew, rain or high humidity to prevent any possible deleterious effects on the safety and quality of the material source. Where practicable, only the amount that can be processed in a timely manner should be harvested in order to minimize potential degradation of active ingredients, occurrence of microbial fermentation and growth of mycotoxin-producing molds. When the amount harvested exceeds processing capabilities, the excess should be stored under appropriate conditions.

Harvesting tools and equipment should be well maintained to prevent damage and contamination from soil and other materials.

3.2.1 Prevention of Cross-Contamination

Specific control methods should be implemented to minimize the risk of cross-contamination associated with primary production and post-harvest activities. The following should be considered:

- Where appropriate, interfaces (e.g. clean cloth, plastic sheet, plant materials, etc.) between the harvested materials and the soil should be used during harvest to avoid contamination by dirt or foreign matter that has fallen prior to harvesting.

Plant material used as interfaces should be used only once.

- Appropriate harvesting containers should be kept clean and should be exclusively used for holding material sources of natural ingredients. When not in use, it should be kept in clean, dry area that is protected from the entry of pests and animals.

- Equipment and containers previously used for potentially hazardous materials (e.g. garbage, manure, chemicals, etc.) should not have direct contact with harvested parts of raw materials.

- Material sources parts that has fallen to the ground and damaged should be segregated and disposed of properly if it cannot be made safe by further processing to avoid contamination of other harvested materials.

- In case of adverse weather conditions, a need for additional management action should be done following a disaster preparedness/risk management plan.

3.2.2 Storage and Transport from the Production Area to the Processing Establishment

The containers, conveyances for transporting, and storage area for the harvested material sources of natural ingredients should be designed to protect against outdoor conditions that may result to contamination.

Material sources of natural ingredients to be transported should be appropriately packed or stored to avoid contamination.

Harvested material sources should be provided with pallets or hung under a non-leaking roof in a cool dry place. Batch or lot codes should be assigned to each group of harvested materials for proper identification.

3.3 Cleaning, Maintenance and Personnel Hygiene at Primary Production

Appropriate facilities and procedures should be in place to facilitate cleaning and disinfection. Equipment should function and be used as intended to prevent

contamination of material sources of natural ingredients. Cleaning materials and hazardous substances should be easily identifiable and stored separately in secured storage facilities. Any necessary cleaning and maintenance should be carried out effectively.

3.3.1 Cleaning Programs and Methods

Cleaning and disinfection systems should be monitored for effectiveness and should be regularly reviewed and adapted to reflect changing circumstances. Appropriate cleaning methods and materials should be adopted depending on the type of equipment and the nature of the material source of natural ingredients.

Personnel should be trained on appropriate cleaning and disinfection methods regularly.

Harvesting tools and equipment, including knives, pruners, machetes, that come in contact with material sources of natural ingredients should be cleaned and maintained regularly. Equipment should be allowed to dry before use.

Clean water should be used to clean all equipment directly contacting material sources of natural ingredients, including farm machinery, harvesting and transportation equipment, containers and tools.

Waste water from cleaning facilities should not come in contact with the primary production and processing areas of material sources of natural ingredients. Treated waste water may be used as source of irrigation for cultivation areas, cleaning of farm implements, and washing of facilities (e.g. toilet, processing areas, etc.).

Section 4 - CONTROL OF OPERATIONS

4.1 Control of Food Hazards

Food and material safety management system should be used to control food hazards at each step of production and post-harvest operations. The system should help:

- Identify any steps in their operations which are critical to the safety of finished product;
- 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.

In some cases a system based on expert advice, and involving documentation, may be appropriate.

4.2 Incoming Raw Material Requirements

Natural ingredients or its material sources should not be accepted by the establishment if they are known to contain contaminants which will not be reduced to acceptable levels by normal processing procedures, sorting or preparation.

Precautions should be taken to minimize the potential for contamination of the establishment and other products from incoming materials that may be contaminated. Where appropriate, specifications for raw materials should be identified, agreed and complied by the supplier and processor. Natural ingredients should be obtained from approved suppliers. An approved supplier is one that can provide documentation (e.g. certificate, inspection/audit report, certificate of analysis, etc.) providing assurance that appropriate controls have been implemented to minimize the possibility that chemical, physical and microbiological contamination occurs in the raw materials. Because of the diversity of production practices for natural ingredients, it is important to understand the controls in place for production of the incoming material. When the control measures used to produce the material source of natural ingredients are not known, verification activities such as inspection and testing should be increased.

Raw materials should be inspected and sorted prior to processing (foreign matter, odor and appearance, visible mold contamination). Where necessary, laboratory tests, e.g. for microbial and chemical, should be conducted to establish fitness for use.

Stocks of raw materials should be subjected to effective stock rotation. Follow first-in, first-out (FIFO) principles.

4.3 Key Aspects of Hygiene Control Systems

4.3.1 Specific Process Steps

4.3.1.1 Cleaning of Natural Ingredients Raw Materials

Natural ingredients raw materials should be cleaned properly (e.g. culled and sorted) to remove physical hazards (e.g. insect and plant fragments, metal chips and other foreign material) and prevent growth of biological hazards (e.g. molds, pests, etc.). Raw materials should be trimmed to remove any damaged, rotten or moldy material.

Debris from culling and sorting should be periodically collected and stored away from the drying, processing and packaging areas to avoid cross-contamination and attracting pests.

4.3.1.2 Drying

Harvested materials should be immediately dried using prescribed methods of drying to reduce moisture content (MC) to 5-10% to prevent deterioration, bacteria, molds and fungi attack, and other pest infestation. In the absence of moisture meter, alternative method (e.g. percent by weight) may be used in determination of moisture content. Efforts should be made to achieve uniform drying of plant materials.

Drying of raw material parts in direct contact with drying pavements/soil is prohibited to avoid damage and contamination. Mechanical drying is recommended in drying the raw material parts.

The drying process should dry the materials as quickly as possible, at temperature levels which do not drive off the volatile components in the material sources. The

drying temperature will be specific to each material source but in general drying temperatures should not exceed 70°C.

4.3.1.3 Extraction

The extraction of material sources (e.g. essential oils, aqueous solutions, etc.) can be achieved by a number of different methods. The methods of extraction, among others, include:

- a.** Water or Hydro distillation. In this method, the material is completely immersed in water, which is boiled by applying heat. The main characteristic of this process is that there is direct contact between boiling water and material source.
- b.** Water and steam distillation is an improved method, the still contains a grid which keeps the material source above the water level. The water is boiled below the charge and wet steam passes through the material source.
- c.** Steam distillation is the process of distilling material source with the steam generated outside the still in a stand-alone boiler.
- d.** Solvent extraction is the use of solvents, such as petroleum ether, methanol, ethanol, or hexane, to extract the active material from the source.
- e.** Expression or cold pressing, as it is also known, refers to any physical process in which the essential oil glands in the peel are crushed or broken to release the oil. Expression is used exclusively for the extraction of citrus oil from the fruit peel, because the chemical components of the oil are easily damaged by heat.

Appropriate extraction method should be used depending on the nature of the material, the stability of the chemical components and the specification of the targeted product. For each method there may be many variations and refinements and the extraction may be conducted under reduced pressure (vacuum), ambient pressure or excess pressure.

4.3.2 Contaminants

Microbiological, chemical or physical specifications used in any food control system, such specifications should be based on sound scientific principles and state, where appropriate, monitoring procedures, analytical methods and action limits.

Where appropriate, specifications for pathogenic and toxigenic microorganisms, chemical residues, foreign materials, and decomposition should be established that take into account subsequent processing steps, the end use of the natural ingredients and the conditions under which the product was produced.

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

- a)** Be free from pathogenic and toxigenic microorganisms in levels that may present a risk to health; and should comply with the provisions for food additives;

- b)** Not contain any substances originating from microorganisms, particularly mycotoxins, in amounts that exceed the internationally acceptable standards or, where these do not exist, by the competent authority;
- c)** Not contain levels of insect, bird or rodent contamination that indicate that natural ingredients have been prepared, packed or held under unsanitary conditions;
- d)** Not contain chemical residues resulting from the treatment of natural ingredients in excess of levels established by international standard setting bodies or, where these do not exist, by the competent authority;
- e)** Comply with the provisions for contaminants, and with maximum levels for pesticide residues established by international standard setting bodies or, where these do not exist, by the competent authority.

In view of the limitations of end-product testing, food safety should be assured through the design of an appropriate food safety control system and by verification of the implementation of the system and the effectiveness of the control measures e.g. through appropriate quality assurance or quality control auditing methods.

Microbiological testing can be a useful tool to evaluate and verify the effectiveness of food safety and sanitation practices, provide information about an environment, a process, and even a specific product lot, when sampling plans and methodology are properly designed and performed. The intended use of information obtained (e.g. evaluating the effectiveness of a sanitation practice, evaluating the risk posed by a particular hazard, etc.) can aid in determining what microorganisms are most appropriate to test for. Test methods validated for the intended use should be selected. Consideration should be given to ensure proper design of a microbiological testing program. Trend analysis of testing data should be undertaken to evaluate the effectiveness of food safety control systems.

Systems should be in place to prevent contamination of products by physical hazards such as broken glass, metal chips, pebbles and unwanted chemicals. Appropriate detection or screening methods and devices should be used to remove the contaminants. Devices should be cleaned frequently.

Verification activities may include, as necessary, appropriate environmental and/or product testing. When monitoring control measures and verification results demonstrate deviations, appropriate corrective action should be taken and the finished product should not be released until it is shown that it complies with appropriate specifications.

4.4 Packaging

All packaging materials should be stored in a clean and sanitary manner. Packaging design and materials should provide adequate protection for products to avoid contamination, prevent damaged and accommodate proper labeling. Packaging materials used must be non-toxic and do not pose a threat to the safety and quality of end product under the specified conditions of storage and use.

It is recommended that new containers be used for food contact packaging. If reusable containers are used, they should be properly cleaned and disinfected before use. All containers should be in good condition and particular attention paid to parts that can become potential contaminants. Only packaging material required for immediate use should be kept in the packaging or filling area.

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

4.5 Water

Only potable water should be used in processing of natural ingredients to avoid contamination. Exception will be given for water used for steam production, fire control, in certain processes (e.g. cooling) and other similar purposes, provided that this does not constitute threat to the safety and quality of the product.

Recycled water should be treated and maintained in a manner that it will not pose any risk to the safety of the product. The treatment process should be effectively monitored.

4.6 Documentation and Records

Standard operating procedures should be adopted and documented. All processes and procedures involved in the production of natural ingredients and the dates on which they are carried out should be documented.

Where practicable, a written food safety control plan that includes a description of each of the hazards identified in the hazard analysis process, as well as the control measures that will be implemented to address each hazard, should be prepared by growers/processors.

The description should include the following:

- Evaluation of the production site
- Water and distribution system
- Manure use and composting procedures
- Personnel health history reporting policy
- Sanitation procedures
- Training programs

The following are examples of the types of records that should be retained:

- Farm profile
- Farm Management records
- Microbiological and Chemical Analyses
- Soil and water analyses, if applicable
- Employee health and training records
- Cleaning and sanitation reports
- Equipment monitoring and maintenance records (e.g. calibration)
- Inspection/audit records, if applicable

Follow the principle of write what you do and do what you write. Updated records should be kept one year after the expiration date.

4.7 Traceability/Product Tracing and Recall Procedures

Growers/processors should have effective procedures for the rapid recall of implicated products. Records should identify the source (or lot and batch number) of incoming raw materials and link the source or lot to the lots of outgoing products to facilitate traceability/product tracing. Information that should be included are the date of harvest/processing date, farm identification, and, where possible, the persons involved in the process.

The recalled supplied raw materials should be based on the supplier-buyer agreement which shall prevail after the final analysis on the status of the product.

Section 5 - ESTABLISHMENT: DESIGN AND FACILITIES

5.1 Premises and Rooms

Where practicable, design and layout of establishments should permit good hygienic practices, including protection against cross-contamination between and during operations.

They should be designed to facilitate hygienic operations by means of a regulated flow in the process (one way flow direction) 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.

Structures within establishments should be soundly built of durable materials and be easy to maintain, clean and where appropriate, able to be disinfected. All construction materials should be such that they do not transmit any undesirable substances to natural ingredients and do not emit toxic vapors.

Procedures should be established to inspect the integrity of the establishment (e.g. for roof leaks, floor crevices, etc.); such problems should be corrected as soon as they are detected.

Premises and rooms used for natural ingredients should be physically separated from wet processing areas and designed such that they can be cleaned routinely with little or no water, when wet cleaning is required, premises and rooms should be thoroughly dried before introducing natural ingredients again.

Proper ventilation should be in place to correctly manage temperature, humidity and dust in the establishment. Exhaust vents should be hygienically designed to prevent the formation and accumulation of condensation around the vent exit and to prevent water from re-entering the establishment. Exhaust ducts should be cleaned on a regular basis and should be designed to prevent reverse airflow.

5.2 Equipment

Equipment should be designed to facilitate cleaning and disinfection with little or no water and, when wet cleaning is required, to allow thorough drying before reusing the equipment for natural ingredients. Alternatively the design should allow disassembly such that parts can be taken to a room designed for wet cleaning and disinfection, when applicable. The equipment design should be as simple as possible, with a minimal number of parts and with all parts and assemblies easily accessible and/or removable for inspection and cleaning. Equipment should not have pits, cracks, corrosion, crevices, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets, or dead ends.

Hollow areas of equipment as well as cracks and crevices should be eliminated whenever possible or permanently sealed. Items such as bolts, studs, mounting plates and brackets should be continuously welded to the surface and not attached via drilled and tapped holes. Welds should be ground and polished smooth.

Push buttons, valve handles, switches and touch screens should be designed to ensure product and other residues (including liquid) do not penetrate or accumulate in or on the enclosure or interface.

Equipment should be installed so as to allow access for cleaning and to minimize transfer of dust particles to other pieces of equipment or to the environment.

Equipment used to cook, heat treat, cool or store natural ingredients should be designed to achieve the required temperatures as rapidly as necessary in the interests of food safety and suitability, and maintain them effectively.

Containers for waste, by-products and inedible or dangerous substances should be identified and made of impervious material.

5.3 Facilities/Storage

Natural ingredients are susceptible to microbial contamination and/or growth if storage conditions are not appropriate. Natural ingredients should be stored in an environment with humidity that does not result in product moisture that can support the growth of microorganisms.

Storage facilities should be properly designed to protect natural ingredients from adverse conditions (heat, excess moisture accumulation and pests).

Section 6 - ESTABLISHMENT: MAINTENANCE AND SANITATION

6.1 Maintenance and Cleaning

A cleaning and disinfection schedule should be established to ensure that all areas of the establishment are appropriately cleaned and that special attention is given to critical areas including equipment and materials.

Cleaning should remove processing debris and dirt which may be a source of contamination. The cleaning methods and materials will depend on the nature of the product and establishment.

Minimal amounts of water should be used during cleaning. Wet cleaning should be followed by disinfection and thorough drying in order to inhibit the growth of microorganisms.

Cleaning and disinfection should be done regularly and monitored for its effectiveness. All cleaning and disinfection activities carried out should be documented.

6.2 Pest Control Systems

There should be an effective and continuous pest management program to control pests. Establishments should be regularly inspected for evidence of infestation.

In case of infestation, eradication measures should be implemented. Treatment with chemical, physical or biological agents should be carried out with appropriate measures and undertaken by trained personnel.

There should be a documented pest control procedures. Application of pest control agents should be done in accordance with the instructions established by regulatory authorities.

6.3 Waste Management

Suitable provision must be made for the storage and removal of waste. Storage areas for waste should be kept clean. Care should be taken to prevent access to waste by pests.

Section 7 - TRANSPORTATION

Natural ingredients products should be adequately protected during transport against potential contaminants, including dusts and adverse outdoor conditions.

Section 8 - LABELING REQUIREMENTS

A label affixed to the packaging should clearly indicate the scientific name of the natural ingredient, the place of origin (collection/harvesting site), name of grower/processor, quantitative information, and quality approval in accordance with current labeling requirements.

The label should bear a number that clearly identifies the production batch. Additional information about the production and quality parameters of the natural ingredients may be added, which is clearly linked to the secondary packaging (e.g. cartons, etc.) carrying the same batch number.

The label should indicate the following information:

- Date harvested/collected
- Date processed/Manufacturing date
- Expiry date
- Scientific name, variety and common name (optional)
- Material part used
- Net weight/Quantitative information
- Source/grower/processor name and contact details
- Storage conditions

Annex A
(Informative)

A.1 Characteristics of the oil of lemongrass [*Cymbopogon flexuosus* (Nees ex Steudel) J.F. Watson] – East Indian

Appearance	Clear, mobile liquid
Color	Pale yellow to yellowish brown
Odor	Strong, green, resembling that of citral
Miscibility in ethanol, 70% (volume fraction), at 20 °C	It shall not be necessary to use more than 3 volumes of ethanol, 70% (volume fraction), to obtain clear solution with 1 volume of essential oil.

A.2 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristic components shown in Table 1 shall be identified. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table A1 – Chromatographic profile

Component	Minimum %	Maximum %
Limonene	0,5	3,5
6-Methyl-5-heptene-2-one	0,1	2,0
Caryophyllene	0,2	3,5
Neral	25,0	35,0
Geranial	35,0	47,0
Geranyl acetate	0,5	6,0
Geraniol	1,5	8,0

Annex B
(Informative)

B.1 Characteristics of the oil of lemongrass (*Cymbopogon citratus*) – West Indian

Appearance	Clear, mobile liquid
Color	Pale yellow to orange-yellow
Odor	Characteristic with a strong note of citral
Solubility in ethanol at 20 °C	Freshly distilled oils are soluble in 70% (V/V) ethanol. The solubility diminishes on storage and the oil may become insoluble in 90% (V/V) ethanol

Annex C
(Informative)

C1. Characteristics of the oil of citronella [*Cymbopogon winterianus* Jowitt syn. *Cymbopogon nardus* (L.) Will. Watson var. *maha-pengiri* Winter] – Java type

Appearance	Clear, sometimes slightly opalescent, mobile liquid
Color	Pale yellow to pale yellowish brown
Odor	Slightly sweet, floral, rosy, lemon-like
Miscibility in ethanol, 80% (volume fraction), at 20 °C	It shall not be necessary to use more than 2 volumes of ethanol, 80% (volume fraction), to obtain clear solution with 1 volume of essential oil Sometimes opalescence can arise on continuing the addition of ethanol

C.2 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristic components shown in Table 1 shall be identified. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table C1 – Chromatographic profile

Component ^a	Minimum, %	Maximum, %
Limonene	2,0	5
Citronellal	31	39
Linalool	0,5	1,5
Isopulegol	0,5	1,7
β-Elemene	0,7	2,5
Citronellyl acetate	2,0	4
Germacrene-D	1,5	3
Geranial	0,3	11
Geranyl acetate ^b	2,5	5,5
δ-Cadinene ^b	1,4	2,5
Citronellol	8,5	13
Geraniol	20	25
Elemol	1,3	4,0
Eugenol	0,5	1
^a Components are listed according to their elution order on a polar column. ^b Area %: Values based on apolar column data.		

Annex D
(Informative)

D.1 Characteristics of the oil of citronella [Cymbopogon nardus (L.) W. Watson var. lenabatu Stapf.] – Sri Lanka type

Appearance	Clear, mobile liquid
Color	Pale yellow to pale brownish yellow
Odor	Leafy, earthy
Miscibility in ethanol, 80% (volume fraction), at 20 °C	It shall not be necessary to use more than 2 volumes of ethanol, 80% (volume fraction), to obtain clear solution with 1 volume of essential oil

D.2 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristic components shown in Table 1 shall be identified. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table D1 – Chromatographic profile

Component ^a	Minimum, %	Maximum, %
Camphene	7,0	10,0
Limonene	7,0	11,5
Citronellal	3,0	6,0
Borneol	4,0	7,0
Citronellol	3,0	8,5
Geraniol	15,0	23,0
Methyl isoeugenol	7,0	11,0

Annex E
(Informative)

E.1 Characteristics of the oil of elemi (*Canarium luzonicum* Miq.)

Appearance	Liquid
Color	Colorless to pale yellow
Odor	Characteristic, spicy balsamic with a citrus peel top note

E.2 Chromatographic profile

Analysis of the essential oil shall be carried out by gas chromatography. In the chromatogram obtained, the representative and characteristic components shown in Table 1 shall be identified. The proportions of these components, indicated by the integrator, shall be as shown in Table 1. This constitutes the chromatographic profile of the essential oil.

Table E1 – Chromatographic profile

Component ^a	Minimum, %	Maximum, %
Sabinene	3	8
α -Phellandrene	10	24
Limonene	40	72
α -Terpineol	0,4	3
Elemol	1	25
Elemicin	0,5	8



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**Department of Agriculture
Bureau of Agriculture and Fisheries Standards**

**Technical Working Group for the Development of the Code of Hygienic
Practice for Natural Ingredients**

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