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MS 1784-8 (2009) (English): GOOD AGRICULTURAL
PRACTICE (GAP) - PART 8: HERBS



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MALAYSIAN STANDARD

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GOOD AGRICULTURAL PRACTICE (GAP) - PART 8: HERBS

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Committee representation

The Industry Standards Committee on Agriculture (ISC A) under whose authority this Malaysian Standard was developed, comprises representatives from the following organisations:

Cameron Highland Flower Growers Association
Department of Agriculture Malaysia
Department of Standards Malaysia
EPA Management Sdn Bhd
Farmers Organization Authority
Federal Agricultural Marketing Authority
Federation of Livestock Farmers' Associations of Malaysia
Johor Fish Breeders Association
Malaysian Agricultural Research and Development Institute
Malaysian Agrifood Corporation Berhad
Malaysian Association of Standards Users
Malaysian Fruit Exporters Association
Malaysian Palm Oil Association
Malaysian Rubber Board
Ministry of Agriculture and Agro-based Industry
Ministry of International Trade and Industry
Ministry of Plantation Industries and Commodities
Rubber Industry for Smallholders Development Authority
Universiti Putra Malaysia

The Technical Committee on Good Agricultural Practice for Crop Commodities which supervised the development of this Malaysian Standard consists of representatives from following organisations:

Cameron Highlands Floriculturists Association
Commercial Orchid Growers Association of Malaysia
Department of Agriculture Putrajaya
Department of Agriculture Sabah
Department of Agriculture Sarawak
Federal Agricultural Marketing Authority
Malaysian Agricultural Research and Development Institute
Malaysian Agrifood Corporation Berhad
Malaysian Herbal Corporation
Malaysian Palm Oil Association
Malaysian Palm Oil Board
Malaysian Rubber Board
Ministry of Agriculture and Agro-based Industry
Ministry of Health Malaysia
Ministry of Plantation Industries and Commodities
National Association of Small Holders
Persekutuan Persatuan-persatuan Pekebun-pekebun Sayur-sayuran Malaysia
QA Plus Asia Pacific Sdn Bhd
Sime Darby Research Centre
SIRIM Berhad (Secretariat)

Co-opted member:

Malaysian Agrifood Corporation Berhad

The Task Force on Herbs which developed this Malaysian Standard consists of representatives from the following organisations:

Biotropics Malaysia Berhad
Forest Research Institute Malaysia
Malaysian Agricultural Research and Development Institute
Malaysian Agrifood Corporation Berhad
Malaysian Herbal Corporation
Nasuha Enterprise Sdn Bhd
Sime Darby Research Centre
Universiti Sains Malaysia

FOREWORD

This Malaysian Standard was developed by the Technical Committee on Good Agricultural Practice for Crop Commodities under the authority of the Industry Standards Committee on Agriculture. A Task Force on Herbs was established in drafting this standard.

This Malaysian Standard is intended to be used in certification schemes to recognise and certify farms and collection activities which adopt Good Agricultural and Collection Practices (GACP) for Herbs in Malaysia.

The structure and presentation of this Malaysian Standard follows MS 1784:2005, *Crop commodities - Good Agricultural Practice (GAP)*. Where elements of MS 1784:2005 are not applicable to this Malaysian Standard, they are stated as such.

This Malaysian Standard consists of the following parts, under the general title *Good Agricultural Practice (GAP)*:

Part 1: Crop commodities

Part 2: Oil Palm (Elaeis guineensis Jacq.)

Part 3: Rubber (Hevea brasiliensis Muell. Arg.)

Part 4: Cocoa (Theobroma cacao)

Part 5: Pepper (Piper nigrum L).

Part 6: Flowers and ornamentals

Part 7: Fruits and vegetables

Part 8: Herbs

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.

GOOD AGRICULTURAL PRACTICE (GAP) - PART 8: HERBS

1 Scope

This Malaysian Standard prescribes a generic code of practice that defines essential elements for agricultural producers to promote Good Agricultural and Collection Practices (GACP) for sustainable crop production and collection of herbs from the wild sources that is legally compliant, environmentally sound, socially acceptable and economically viable and suitable for utilisation and/or consumption to ensure quality, safety and efficacy for intended use.

2 Normative references

The following normative references are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the normative reference (including any amendments) applies.

MS ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

Environment Quality Act 1974 and Environment Quality Regulations 1979

Pesticide Act 1974

Food Act 1983 and Food Regulations 1985

Sale of Drugs Act 1952, Revised 1989

Control of Drugs & Cosmetics Regulation 1984

Poison Act 1952, Revised 1989

Medicines Act - Advertisement and Sale, 1956, Revised 1983

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 Collector

Entities involved in commercial collection of herbs from the wild including individuals and companies.

3.2 Crop producer

Entities involved in commercial production of crops including individuals and companies.

3.3 Economically viable production

Production that gives positive returns on a sustainable basis.

3.4 Environmentally sound

Farm and collection practices that do not have adverse effects on the environment, e.g. chemical pollution of water ways, effluent discharge.

3.5 Essential element

Critical, main or key factor.

3.6 Herbal drug preparation

Herbal drug preparation is obtained by subjecting herbal drugs to treatment such as extraction, distillation, expression, fractionation, purification, concentration or fermentation. These include comminute or powdered herbal drugs, tinctures, extracts, essential oils, expressed juices and processed exudates.

3.7 Herbal drugs

Herbal drugs are mainly whole, fragmented or cut, plants, parts of plants, algae, fungi, lichen in an unprocessed state, usually in dried form but sometimes fresh. Certain exudates that have not been subjected to a specific treatment are also considered to be herbal drugs. Herbal drugs are precisely defined by the botanical scientific name according to the binomial system (genus, species, variety and author).

3.8 Herbal medicine

Herbal medicines include herbs, herbal materials, herbal preparations and finished herbal products.

3.9 Herbs

Herbs include crude plant material such as leaves, flowers, fruit, seed, stems, wood, bark, roots, rhizomes or other plant parts, which may be entire, fragmented or powdered. Herbs also cover medicinal and aromatic plants.

3.10 Integrated Pest Management (IPM)

A management system that uses all suitable techniques and methods in a manner as compatible as possible to maintain pest population at levels below those causing economic injury.

3.11 Legally compliant

Adherence to all existing national legislation.

3.12 Pests

Organisms those are capable of causing injury and loss to crops. These organisms include insects, other invertebrates, fungi, bacteria, viruses, weeds and vertebrates.

3.13 Quality produce

Produce that is wholesome and safe for consumption and/or suitable for utilisation.

3.14 Socially acceptable

Meeting concerns on the welfare and safety of persons working or living in the farm.

3.15 Sustainable crop production

A holistic, systems-oriented approach to farming that is efficient in resource management and focuses on the interrelationship of social, economic and environmental processes. This approach is based upon environmentally sound, socially responsible and economically profitable practices.

3.16 Wild sources

Collection of plants or plant parts which are not cultivated. It is also known as wild crafted.

4 Good agricultural practices requirements

4.1 Traceability

The produce shall be traceable to the farm where it has been originally produced or the site where it has been collected.

4.2 Record keeping and internal audit

4.2.1 Record keeping

Producers and collectors shall keep up-to-date records. All records shall be maintained and retained for at least six months unless stipulated by any specific legislation. Record keeping system shall be established in which all the essential elements are captured. The records shall be accessible and audited. All farm records shall be treated as confidential.

4.2.2 Internal audit

Internal audit shall be carried out at least once a year based on the requirements of this standard. It shall be completed and documented. Corrective actions shall be implemented and documented.

4.2.3 Documentation

All processes and procedures that could affect the quality of the product shall be documented.

4.2.3.1 Extraordinary circumstances during the growth period that may influence the chemical composition of the medicinal herbs such as extreme weather conditions and pests, particularly in the harvest period shall be documented.

4.2.3.2 For cultivated herbs all agronomic steps should be documented including the location of cultivation. Field records showing previous crops and plant protection products used should be maintained by all producers.

4.2.4 For cultivated herbs, producers shall document the type, quantity and the date of harvest of the herbs as well as the chemicals and other substances used during production such as fertilisers, pesticides, herbicides and growth promoters.

4.2.5 The application of fumigation agents shall be documented.

4.2.6 The geographic location of the collection area and the harvest period should be described as precise as possible.

4.2.7 All batches from each designated area shall be identified by batch number. Assignment of batch number should take place at an early stage. Collected and cultivated herbs should carry different batch numbers.

4.2.8 Batches from different geographical sites shall be mixed only if it can be guaranteed that the mixture itself will be homogenous. Such processes should be well documented.

4.2.9 All agreements (production guidelines, contracts, etc.) between producer or collector and buyer should be in written form. It should be documented that cultivation, harvesting and production have been performed in accordance with these agreements. Minimum information included in the documentation should cover geographical location, country of origin and responsible producer.

4.2.10 The results of audits should be documented in an audit report (copies of all documents, audit reports, analysis reports) to be stored for a minimum of two years.

4.3 Planting materials and rootstocks

4.3.1 Choice of planting materials or rootstocks should meet requirements as agreed between crop producers and buyers with regard to quality such as content of active principle, macroscopical and organoleptic properties, limit values for microbial contamination, chemical residues and heavy metal.

4.3.2 The use of genetically modified planting materials shall be avoided unless expressed permission has been given by the relevant authorities and should comply with existing regulations in the country of the final consumers. The planting of genetically modified organism (GMO) shall be agreed between crop producers and customers before planting.

4.3.3 Quality of planting materials should be known before use and a record of the variety name, variety purity, batch number and vendor should be kept. Where available, seed certification records should be retained.

4.3.4 The presence of different species, varieties or different plant parts should be controlled during the entire production process, and such adulteration should be avoided.

4.3.5 Where grafted planting materials are used, records should also be kept of the variety of the rootstock.

4.3.6 Where protected varieties are used, the farm shall respect intellectual property right legislation on plant variety protection.

4.3.7 Varieties used for planting in the farm should preferably possess resistance or tolerance to major pests and diseases, so as to minimise usage of pesticide.

4.3.8 If seed treatments are carried out, the use of these treatments should be justified and shall be recorded.

4.4 Site history and site management

4.4.1 Site history

4.4.1.1 A recording system shall be established for the site history and the layout of fields of their crop history.

4.4.1.2 For all new agricultural sites, a risk assessment shall be carried out, taking the following into account:

- a) prior use of the land;
- b) potential impacts of the production on adjacent crops and sites; and
- c) potential impact of activities carried out at adjacent sites.

The information of the risk assessment shall be recorded.

4.4.1.3 Farms shall not be located more than 1000 m above sea level unless the land was developed prior to 1 January 2002.

4.4.1.4 Farms should not be located on steep slopes which may be detrimental to the environment.

4.4.1.5 Risk of contamination as a result of pollution of the soil, air or water by hazardous chemicals should be avoided. The impact of past land uses on the cultivation site, including the planting of previous crops and any applications of plant protection products should be evaluated.

4.4.1.6 The site should not be contaminated with sludge, heavy metals, residues, plant protection products or other chemicals. Any chemical used in the growth or protection of the crop should be kept to a minimum.

4.4.2 Site management

4.4.2.1 The farm management shall demonstrate that it has legal rights to the cultivation of the land and all necessary regulatory approvals.

4.4.2.2 Where farms are located on sloping land (within the permissible level), appropriate soil conservation measures shall be undertaken to prevent soil erosion and silt deposition into drains and waterways.

4.5 Soil and substrate management

4.5.1 Soil type mapping

Soil map should be prepared for the farm, which can then be used to plan planting, growing programmes and cropping system.

4.5.2 Cultivation

Cultivation practices proven to improve or maintain soil structure and to avoid soil compaction should be followed.

4.5.3 Soil erosion

Field cultivation techniques that minimise soil erosion shall be adopted.

4.5.4 Soil fumigation

Alternative methods such as crop rotation, planting of break crops, use of disease resistant cultivars, thermal or solar sterilisation, conversion to soil-free cultivation, and similar techniques shall be explored before resorting to use of chemical fumigants.

4.5.5 Substrates

4.5.5.1 Preference should be given to the use of organic substrates.

4.5.5.2 For inert substrates (e.g. perlite, rock wool), crop producers are encouraged to participate in substrate recycling programmes.

4.5.5.3 Where chemicals are used to sterilise substrates for re-use, records shall be kept and shall contain location of sterilised substrates. Steaming should be the preferred option of sterilisation.

4.5.5.4 Where chemicals are used to sterilise substrates for re-use, records of date, type of chemical used, method of sterilisation and name of operator shall be kept.

4.6 Fertiliser management (organic and inorganic)

4.6.1 Nutrient requirement

4.6.1.1 Soil care plan should be developed to ensure that nutrient loss is minimised.

4.6.1.2 The application of fertilisers should be based on nutrient levels of the soil or substrates and requirements of the crop.

4.6.2 Fertiliser utilisation

4.6.2.1 Usage of fertilisers should be in accordance with science based recommendations or best developed practice.

4.6.2.2 The type, quantity, method, timing and frequency of fertiliser application should be carefully observed so as to maximise benefits and minimise losses.

4.6.3 Records of application

All applications of soil and foliar fertilisers shall be recorded. Records shall include location, date of application, type and quantity of fertiliser applied, the method of application and name of operator.

4.6.4 Application machinery

Fertiliser application machinery shall be kept in good working condition.

4.6.5 Fertiliser source and storage

4.6.5.1 Fertiliser stock records shall be kept up-to-date and made available.

4.6.5.2 Fertilisers should not be stored in the same room with pesticides. If this is not possible, the fertilisers and the pesticides shall be physically separated and labelled accordingly.

4.6.5.3 Fertilisers shall be stored in a covered, clean, dry location where there is no risk of contamination of water sources.

4.6.5.4 Fertilisers shall not be stored with nursery stock.

4.6.5.5 Fertilisers shall not be stored with fresh produce.

4.6.5.6 All hazard and risk areas to human shall be clearly indicated.

4.6.5.7 Record of source and chemical content of fertiliser used shall be made available.

4.6.6 Organic fertiliser

4.6.6.1 Organic fertiliser should be stored in an appropriate manner to reduce the risk of contamination of the environment.

4.6.6.2 The use of untreated and treated human sewage sludge and pig waste shall be prohibited.

4.6.6.3 To avoid pollution by heavy metals or by nitrate leaching, analysis of levels of nutrients, heavy metals and other potential pollutants in the organic fertiliser, should be completed before application

4.6.6.4 Organic fertilising in open field cultivation should be based on nutrient management plans.

4.6.6.5 Source of organic fertiliser used shall be recorded.

4.7 Irrigation and fertigation

4.7.1 Planning

Crop producers are recommended to base their irrigation or fertigation requirement on sound historical and scientific data.

4.7.2 Method

4.7.2.1 The most efficient and commercially practical water delivery system should be used to ensure the best utilisation of nutrient and water resources.

4.7.2.2 Consideration should be given to a water management plan to optimise water and nutrient usage and reduce wastage (e.g. systems for re-use, application at night, maintenance of equipment to reduce leakage and collection of rainwater).

4.7.2.3 All crop producers are encouraged to maintain records of irrigation and fertigation water usage.

4.7.3 Quality of water

4.7.3.1 Untreated sewage water is prohibited for use.

4.7.3.2 Based on risk assessments, water sources should be analysed at least once a year for microbial, chemical and mineral pollutants. The analysis results should adhere to the Environment Quality Act 1974 and Environment Quality Regulations 1979 and adverse results should be acted upon.

4.7.4 Supply of water

Water should be derived from sustainable sources. Crop producers are encouraged to seek advice from relevant authorities on water sourcing.

4.8 Crop protection

4.8.1 Basic elements of crop protection

4.8.1.1 The use of pesticides to protect the crop shall be minimised.

4.8.1.2 Wherever possible, crop producers shall apply recognised Integrated Pest Management (IPM) techniques. Non-chemical control measures are preferred over chemical treatments.

4.8.1.3 Crop producers are encouraged to seek advice on IPM from competent authorities.

4.8.2 Choice of chemicals

4.8.2.1 The crop protection product utilised shall be appropriate for the control required.

4.8.2.2 Crop producers shall only use chemicals that are officially registered under the Pesticide Act 1974, for use on the crop that is to be protected.

4.8.2.3 Selective products that are specific to the target pest and which have minimal effect on populations of beneficial organisms, aquatic life, workers and consumers and are not detrimental to the ozone layer should be used wherever possible.

4.8.2.4 Instructions on the label shall be followed to ensure effective application and to avoid risks to operators, consumers and the environment.

4.8.2.5 An anti-resistance strategy should be adopted to avoid reliance on any one chemical.

4.8.2.6 For crops to be exported, crop producers shall not use chemicals that are banned or disallowed in importing countries.

4.8.2.7 Crop producers should consult their buyers to determine if any additional commercial restrictions exist.

4.8.3 Advice on pesticide usage

Crop producers are encouraged to seek advice on pesticide usage from competent authorities.

4.8.4 Records of application

All applications of pesticide shall include crop name, location and date of application, reason for application, trade name of pesticide used, dosage, method of application and name of operator.

4.8.5 Safety, training and instructions

4.8.5.1 Operators shall be trained on safe and proper use of pesticides.

4.8.5.2 Each area of application should be field marked with appropriate warning sign.

4.8.6 Personal clothing and equipment

4.8.6.1 Operators shall be equipped with suitable personal clothing and equipment appropriate to the danger posed to health and safety.

4.8.6.2 Personal clothing and equipment shall be cleaned after use and stored separately from pesticides.

4.8.7 Pre-harvest interval

Pre-harvest intervals as prescribed on pesticide labels shall be strictly adhered to.

4.8.8 Spray equipment

4.8.8.1 Spray equipment shall be suitable for use on crop and farm in question and shall be kept in good working condition. Calibration should be carried out as and when necessary to ensure accurate delivery of the required quantity of spray.

4.8.8.2 When mixing chemicals, the correct quantity of spray mix for the crop to be treated and the proposed treatment type shall be calculated accurately, prepared and recorded.

4.8.9 Disposal of surplus spray mix

Surplus spray mix and tank washings should be sprayed over an untreated part of the crop as long as the recommended dosage has not been exceeded or on designated fallow land. Records should be kept of such spraying.

4.8.10 Pesticide storage

4.8.10.1 Pesticides shall be stored in accordance with local regulations.

4.8.10.2 Pesticides shall be stored in a sound, secured, water resistant, well ventilated and well-lit location away from other materials.

4.8.10.3 All shelving should be of non-absorbent material.

4.8.10.4 The pesticide store shall be able to retain spillage (e.g. to prevent contamination of water sources).

4.8.10.5 There shall be adequate facilities for measuring and mixing pesticides.

4.8.10.6 There shall be emergency facilities (e.g. plenty of clean water, bucket of sand) to deal with contamination and accidental spillage.

4.8.10.7 Keys and access to the store shall be limited to workers with adequate training in the handling of pesticides.

4.8.10.8 A procedure to handle accidents, a list of contact telephone numbers and the location of the nearest telephone shall be available within the immediate vicinity of the store and next to the nearest telephone.

4.8.10.9 Inventory shall be kept and readily available.

4.8.10.10 All pesticides shall be stored in their original package.

4.8.10.11 Only chemicals registered for use on crops on the farm shall be stored.

4.8.10.12 Powders shall be stored on shelves above liquids or separately.

4.8.10.13 Warning signs of potential dangers shall be placed on access doors.

4.8.11 Empty pesticide containers

4.8.11.1 Empty pesticide containers shall not be re-used and the disposal of empty pesticide containers shall be in a manner that avoids exposure to humans and contamination of the environment.

4.8.11.2 Official collection and disposal systems should be used if available.

4.8.11.3 Empty containers shall be rinsed at least three times with water, and the washings returned to the spray tank.

4.8.11.4 Unless participating in established recycling programmes or with expressed permission from the authorities, rinsed containers shall be pierced to prevent re-use.

4.8.11.5 Empty containers shall be kept secure until disposal is possible.

4.8.11.6 Disposal or destruction of containers shall be in accordance to the Pesticide Act 1974 and/or any other relevant local regulations.

4.8.12 Obsolete pesticides

Obsolete pesticides shall only be disposed through an approved chemical waste contractor.

4.8.13 Equipment

4.8.13.1 Equipment used in plant cultivation and processing should be clean, regularly serviced and oiled to ensure good working order and mounted, where applicable, in an easily accessible way. Furthermore, machinery used in fertiliser and pesticide application shall be regularly calibrated.

4.8.13.2 Those machine parts that are in direct contact with the harvested herbs shall be cleaned after use to ensure that remaining residue does not result in subsequent cross-contamination.

4.8.13.3 The equipment should be made from appropriate materials so that cross-contamination of herbs with chemicals and other non-desirable substances is prevented.

4.9 Harvesting

4.9.1 Hygiene

4.9.1.1 Hygiene protocol for workers appropriate to a particular farm produce should be put in place in order to prevent physical, microbiological and chemical contamination.

4.9.1.2 Workers shall undergo training in basic hygiene and safe handling of fresh produce. They shall be made aware of the requirement to notify management should they contract any transferable diseases, which may render them unfit to work in the vicinity of produce destined for human consumption.

4.9.1.3 Workers shall have access to clean toilet and washing facilities in the vicinity of their work.

4.9.2 Harvesting procedures

4.9.2.1 The harvest should take place when the plants are the best possible quality according to the different utilisation.

4.9.2.2 Damaged plants or parts plants need to be excluded.

4.9.2.3 Herbs should be harvested under the best possible conditions avoiding wet soil, dew, rain or exceptionally high air humidity. If harvesting occurs in wet conditions possible adverse effects on the herbs due to increased moisture level should be counteracted.

4.9.2.4 Herbs should be harvested such that contamination from the soil is reduced to minimum.

4.9.2.5 Cutting devices or harvesters shall be adjusted such that contamination from soil particles is reduced to a minimum.

4.9.2.6 During harvesting, care should be taken to ensure that no toxic weeds mix with harvested herbs.

4.9.2.7 All containers used during harvesting shall be clean and free of contamination from previous harvests. When containers are not in use, they shall be kept in dry conditions free of pests and inaccessible to mice/rodents, livestock and domestic animals.

4.9.2.8 Mechanical damage and compacting of the harvested herbs that would result in undesirable quality changes shall be avoided. In this respect, attention shall be given to avoid overfilling of the sacks and stacking up of sacks.

4.9.2.9 Freshly harvested herbs shall be delivered as quickly as possible to the processing facility in order to prevent thermal degradation.

4.9.2.10 The harvested crop shall be protected from pests, rodents, livestock and domestic animals. Any pest control measures taken should be documented.

4.10 Post harvest handling and on farm processing

4.10.1 Sorting

The produce should be sorted immediately into good or bad products, wherever applicable.

4.10.2 Washing

4.10.2.1 Potable water shall be used for washing of produce.

4.10.2.2 Based on risk assessments source of water for post-harvest washing should be analysed at least once a year for microbial, chemical and mineral pollutants to ensure that it is potable.

4.10.3 Treatment

4.10.3.1 Use of chemical post-harvest treatments should be minimised. When used, it shall be in accordance with product label or established recommendations.

4.10.3.2 When chemicals are used, they shall be in accordance with the relevant legislation including Food Act 1983 and Food Regulations 1985. In addition, where pesticides are involved, they shall be officially registered under the Pesticide Act 1974.

4.10.3.3 For crops to be exported, crop producers should not use chemicals that are banned or disallowed in importing countries.

4.10.3.4 Crop producers should consult their buyers to determine if any additional commercial restrictions exist.

4.10.3.5 Crop producers should be able to demonstrate their competence and knowledge with regard to the post-harvest treatment.

4.10.3.6 Records for all post harvest treatments shall be kept to include crop name, location, date of treatment, reason for treatment, type of post harvest treatment, dosage, methods of treatment and name of operator.

4.10.4 On farm processing

4.10.4.1 On farm processing includes cutting, comminution, drying, distillation and freezing. All of these processes shall conform to national regulations.

4.10.4.2 On arrival at the processing facility the harvested herbs has to be promptly unloaded and unpacked. Prior to processing the material should not be exposed directly to the sun, except in cases where there is a specific need, and shall be protected from rainfall.

4.10.4.3 In the case of natural open air drying, the herbs shall be spread out in a thin layer. In order to secure adequate air circulation, the drying frames shall be located at a sufficient distance from the ground. Drying directly on the ground, polluted areas should be avoided. Attempts shall be made to achieve uniform drying of the herbs and thus avoid mould formation.

4.10.4.4 Except in the case of open air drying, the drying conditions such as temperature and duration shall be selected taking into consideration the plant part such as root, leaf or flower and the nature of its active constituent, such as essential oils. The source of heat in mechanical drying should not be in drying contact with the herbs.

4.10.4.5 All materials shall be inspected, graded and where necessary sorted or sieved in order to eliminate sub-standard product and foreign bodies. Sieves shall be maintained in a clean state and should be serviced regularly.

4.10.4.6 Clearly marked waste-bins should be available, emptied daily and cleaned.

4.10.5 Packaging on farm

4.10.5.1 Packaging material shall be stored to avoid contamination by physical and chemical hazards, as well as pests. It shall be protected from rodents, insects, birds and other animals. Where produce is field packed, packaging shall not be left in the field overnight where risk of contamination exists.

4.10.5.2 Re-usable packaging material shall be cleaned and thoroughly dried prior to use. No contamination should occur through reusing of bags to ensure that they are free from foreign materials which may be detrimental to the produce and/or consumers' health.

4.10.5.3 In order to protect the product and to reduce the risk of pest attacks, early packaging is advisable.

4.10.6 Storage and distribution

4.10.6.1 Packaged dried herbs should be stored in a dry, well-aerated building, in which daily temperature fluctuations are limited and good aeration is ensured. Fresh products should be stored at the appropriate temperature.

4.10.6.2 In the case of bulk transport, it is important to secure dry conditions. Furthermore, in order to reduce the risks of mould formation or fermentation it is advisable to use aerated containers. As a substitute, the use of sufficiently aerated transport vehicles and other aerated facilities is recommended.

4.10.6.3 Fumigation against pest attack should be carried out only where necessary and shall be carried out exclusively by licensed personnel. Only registered chemicals shall be used. Any fumigation against pest attack should be reported in the documentation.

4.10.6.4 In the event of a product found to be of unacceptable quality (e.g. infested with moulds), the product should be immediately isolated and destroyed.

4.10.7 Building and Facilities

4.10.7.1 Buildings used in the processing of harvested herbs shall be clean, as well as thoroughly aerated and shall never have been used for housing livestock.

4.10.7.2 Buildings shall provide adequate protection for the harvested herbs against birds, insects, rodents and domestic animals. In all storage and processing sites suitable pest control measures such as baits and electric insect killing machines shall be operated and maintained by professionally qualified staff or contractors.

4.10.7.3 The packaged herbs shall be stored:

- a) in buildings with concrete or similar easy to clean floors;
- b) on pallets;
- c) with a sufficient distance from the wall;
- d) well separated from other herbs to avoid cross-contamination; and
- e) to adopt first-in-first-out principle.

4.10.7.4 Herbs which are organically grown shall be stored separately.

4.10.7.5 Buildings where plant processing is carried out shall have changing facilities as well as toilets including hand-washing facilities, according to national regulations.

4.11 Pesticide residue analysis of produce

4.11.1 The frequency of pesticide residue analysis shall be based on risk assessment taking into consideration its intended use.

4.11.2 Crop producers and/or collectors shall provide evidence of residue testing.

4.11.3 The test results should be traceable to the crop producer and to the production site.

4.11.4 The laboratories used for residue testing shall be accredited by a competent accreditation authority to good laboratory standards (e.g. ISO/IEC 17025).

4.11.5 Preventive and corrective action plans shall be in place in the event a maximum residue level (MRL) is exceeded.

4.12 Waste and pollution management, recycling and re-use

4.12.1 All possible waste products and sources of pollution should be identified in all sites of the farm business.

4.12.2 Having identified wastes and pollutants, a plan should be developed and implemented, to avoid or reduce wastage and pollution. Whenever possible, landfilling or burning, by recycling the waste shall be avoided. Crop debris may be composted and re-used for soil conditioning.

4.13 Worker health, safety and welfare

4.13.1 Action plan

There should be an action plan to promote safe and good working conditions.

4.13.2 Training

4.13.2.1 Training shall be given to workers operating dangerous or sophisticated equipment.

4.13.2.2 Records of training for each employee shall be kept.

4.13.2.3 Accident and emergency procedures shall be available with clear instructions to all workers. These procedures should be displayed and shall be in the appropriate language of the workforce.

4.13.2.4 Personnel should receive adequate botanical training before performing tasks that require this knowledge.

4.13.2.5 Collectors shall have sufficient knowledge of the plant they have to collect. This includes identification, characteristics and habitat requirement such as shade, humidity, soil etc. The collectors shall be able to differentiate between the collected species and botanically related and/or morphologically similar species to avoid any risk to public health. Collectors should have sufficient knowledge about the best time to harvest and harvesting technique and the importance of primary processing to guarantee the best possible quality.

4.13.2.6 If collectors are without sufficient knowledge, a local supervisor should guarantee the education, supervision and documentation.

4.13.2.7 It is advisable to educate all personnel dealing with the herbs and all those engaged in its cultivation regarding cultivation techniques including the appropriate use of herbicides and pesticides.

4.13.2.8 Collectors of herbs should be instructed on all issues relevant to the protection of the environment and conservation of plant species. This will include information on regulations related to protected species.

4.13.3 Facilities and equipment

First aid boxes shall be available at permanent sites on the farm. Hazards should be clearly identified by warning signs where appropriate.

4.13.4 Pesticide handling

Workers undertaking pesticide applications on the farm should receive health checks in line with guidelines by local regulatory requirements.

4.13.5 Hygiene

4.13.5.1 All permanent product packing and storage sites shall have adequate pest control measures, particularly in sites for food handling, storage of packaging, storage of pesticides and storage of fertilisers.

4.13.5.2 Workers should receive basic training in hygiene requirements for the handling of fresh produce. The training program should outline the need for hand cleaning, the covering of skin cuts and the confinement of smoking, eating and drinking to permitted sites.

4.13.5.3 The premises should be kept clean at all times to avoid establishing a breeding ground for pests.

4.13.6 Welfare

4.13.6.1 All employment conditions shall comply with local and national regulations.

4.13.6.2 If on-site living quarters are provided, they shall be habitable and have basic amenities and facilities.

4.13.6.3 Personnel shall be protected from contact with toxic or potentially allergenic herbs by means of adequate protective clothes.

4.14 Environmental issues

4.14.1 Impact of farming on the environment

Crop producers shall conform to existing environmental legislation. This covers the concern for air, water, soil, biodiversity and other environmental issues.

4.14.2 Wildlife and biodiversity conservation

4.14.2.1 Crop producers should always be conscious of the need to conserve wildlife and biodiversity.

4.14.2.2 Where Environmental Impact Assessment (EIA) is required, consideration for the conservation of wildlife and biodiversity shall include the following sites.

- a) conduct a baseline audit to understand existing animal and plant diversity on the farm. Conservation organisations may be requested to conduct surveys to measure biodiversity and identify sites of concern;
- b) take action to avoid damage and deterioration of habitats; and
- c) create an action plan to enhance habitats and increase biodiversity on the farm.

4.14.3 Unproductive sites

Crop producers are encouraged to convert unproductive sites (e.g. swamps, steep slopes, deep peat, etc.) into conservation sites for natural flora and fauna.

4.15 Record of complaints

Records of complaints on all produce not in compliance with requirements in this standard and their remedial actions shall be made available on site.

5 Good Collection Practices

5.1 Authorised permission to collect

5.1.1 Collection permits and authorised documents from government authorities and landowners shall be obtained prior to collection regime on any plants from the wild.

5.1.2 National legislation should be consulted and adhered to.

5.1.3 The imported herbs should have the relevant documents such as import permits, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) permits and other relevant permits.

5.1.4 Herbs from species that are listed as endangered (CITES) shall not be collected unless approved by the relevant authority.

5.1.5 Individuals should be designated to identify and verify collected herbs and to supervise collectors.

5.1.6 Collection shall be carried out in compliance with existing regional and national and/or national species conservation legislation. Collection methods shall not damage the growth environment ensuring optimum conditions for regeneration of the herbs harvested.

5.2 Technical planning

5.2.1 Prior to a collection expedition, the geographical distribution and population of the target plant species shall be determined.

5.2.2 Essential information on the target plant species such as taxonomy, distribution, phenology, genetic diversity, reproductive biology and ethno botany should be obtained. Data on environmental conditions, including topography, geology, soil, climate and vegetation at the collecting site(s) should be recorded for future planning.

5.2.3 A collection team shall be familiar with good collecting techniques, transport and handling of equipments and medicinal plant materials including cleaning, drying and storage. Training of personnel should be conducted regularly.

5.2.4 Efficient, safe and dependable transportation to carry personnel, equipments, supplies and collected materials should be arranged in advance.

5.3 Selection of herbs for collection

5.3.1 The target plant species collected should be the same as that specified in the national pharmacopoeia or recommended by other authoritative national documents of the end-user country as the source for the herbal materials concerned.

5.3.2 In the case of newly introduced herbs, the species or botanical variety selected for collection should be identified and documented as the source material used or described in traditional medicine in country of origin.

5.3.3 Collectors and producers of herbs and herbal medicine should prepare botanical specimens for submission to regional or national herbaria for authentication.

5.3.4 The voucher specimens should be retained and preserved under proper conditions. The name of the botanist or other personnel who provided the botanical identification or authentication should be recorded. If the herbs is not well known to the community or not of local origin, proper documentation of the botanical identity should be recorded and maintained.

5.4 Collection

5.4.1 The population density of the target species at the collection site(s) should be determined and species that are rare or scarce should not be collected. Collection practices should ensure the long-term survival of wild populations and their associated habitats. Only ecologically non-destructive methods and systems of collection should be employed.

5.4.2 Herbs should be collected during the appropriate season or time to ensure the best possible quality of both source materials and finished products.

5.4.3 The best time for collection should be based according to the quality and quantity of biologically active constituents rather than the total vegetative yield of the targeted medicinal plant parts.

5.4.4 Herbs should not be collected in or near sites where there is high risk of contamination such as roadsides, drainage systems, mines, garbage dumps, industrial facilities

5.4.5 Collected raw material should not come into direct contact with soil. Any adhering soil should be removed as soon as they are collected. Collected materials should be kept in clean baskets; mesh bags or other well aerated containers that are free from foreign matter including plant remnants from previous collecting activities.

5.4.6 After collection, the raw herbs may be subjected to appropriate preliminary processing including elimination of undesirable materials and contaminants, washing, sorting and cutting. The collected materials should be protected from insects, rodents, birds, livestock, domestic animals and other pests.

5.4.7 If the collection site is located some distance from the processing facilities, sun-dry or air-dry the raw materials prior to transport.

5.4.8 If more than one herbal part is to be collected, the different plant species or plant materials should be gathered separately and transported in separate containers to avoid cross contamination.

5.4.9 Collecting instruments such as secateurs, saws, cutters and mechanical instruments should be kept clean and maintained in proper condition. The parts that come into direct contact with the collected herbs should be free of excess oil and other contaminants.

5.5 Personnel

5.5.1 Personnel responsible for the field collection should have formal or informal practical education and training in plant sciences and have practical experience in fieldwork.

5.5.2 Personnel should be responsible for training and supervision of any collectors who lack technical knowledge to perform various task involved in collection process.

5.5.3 Field personnel should have adequate botanical training and be able to identify herbs by their scientific names (Latin) as well as their common or local names. They are also responsible for the supervision of workers and the full documentation of the collection work.

5.5.4 The collection team should take preventive measures to ensure the welfare and safety and the local communities during all the stages of herbs sourcing and trade. Personnel shall be protected from toxic and dermatitis-causing plants, poisonous animals and disease-carrying insects. Appropriate protective clothing, including gloves should be worn if necessary.

6 Legal requirements

All farm activities and produce shall in all other aspects comply with the requirements of the legislations currently in force in Malaysia.

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