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DRAFT BHUTAN STANDARD

Good Agricultural Practices – Field Crops and, Spices and Herbs



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BHUTAN STANDARDS BUREAU

The National Standards Body of Bhutan

THIMPHU 11001

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Director General
Bhutan Standards Bureau
Rijug Lam
Thimphu-11001
Tel: 00975-2-325104/325401
Fax: 00975-2-323712/328298
Web: www.bsb.gov.bt
Published in Thimphu, Bhutan

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FOREWORD

This Bhutan Standard for Bhutan Good Agricultural Practices (GAP) was developed by Bhutan Standards Bureau and adopted as Bhutan Standard after the draft finalized by the Food and Agricultural Technical Committee TC02 and approved by the Bhutan Standards Bureau Board (BSB Board) on Day Month Year.

This Bhutan Standard on GAP serves to fulfill the requirements of GAP for field crops, and spices and herbs which are not included in the BTS 30: 2017 Good Agricultural Practices for fruits and vegetables.

This standard is subjected to systematic review after five years to keep pace with the market trends, industrial and technological developments or as and when deemed necessary. Any suggestions and further information may be directed to the concerned Technical Committee.

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Introduction

Food safety has gained increasing importance over the years due to its significance both from health and economic perspectives. Production of safe food is essential for protecting consumers from the hazards of food borne illness and is important both in the domestic food business as well as for increasing competitiveness in export markets. Hazards may occur at different stages in the food chain starting right from the primary production such as residues of pesticides, other chemicals, heavy metals above permitted levels, microbial contaminants and others. It is therefore, becomes important to address food safety right from the food production at farm level. Implementing Good Agricultural Practices during on-farm production and post-production (post-harvest) processes resulting in safe agricultural products is of immense importance for assuring safe food supply.

Many countries importing food products as well as domestic buyers, especially organized retail are requiring producers to implement GAP as a pre-requisite for procurement to ensure quality and safety of their produce. In addition, implementing GAP also helps promote sustainable agriculture and contributes to meeting national and international environment and social development objectives. It has been documented that implementation of GAP encourages promotion of optimum use of resources such as pesticides, fertilizers, water and eco-friendly agriculture. Its social dimension would be to protect the agricultural workers health from improper use of chemicals and pesticides.

It is hoped that this will encourage not only increased safety of produce in domestic markets but also result in increased regional and global trade.

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Good Agricultural Practices – Field Crops and, Spices and Herbs

1 Scope

This Bhutan Standard specifies the requirements of good agricultural practices for spices and herbs, and field crops covering activities such as production, harvesting and post-harvest handling operations to obtain safe and quality produce either for direct consumption or sale or for further processing taking into account the environmental protection as well as health, safety and welfare of workers.

The standard may be used for all types of production systems, namely conventional production systems where produce are grown in the soil, aeroponics, and hydroponic systems where produce are grown in inert media. Production may occur in the open or in a protected environment.

Produce such as fruits and vegetables, and high-risk products are not covered by this standard. The standard also does not provide any basis for certification of either organic products or GMO status (GMO free products) but these products can also be certified as GAP compliant in case GAP requirements are implemented.

2 Normative References

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including amendments) applies;

BTS 139: 2020 SARS 0014: 2018 Bhutan Standard on Food hygiene- General practices- Code of practice.

BTS 268 CODEX STAN 1-1985 Bhutan Standard on Labelling of prepackaged foods

Labour and Employment Act of Bhutan

National Biodiversity Act of Bhutan

National Biodiversity Strategy and Action Plan

National Environment Policy

Pesticides Act of Bhutan

Pesticides Rules and Regulation of Bhutan

Water Act of Bhutan

Water Regulations of Bhutan.

3 Terms and Definitions

For the purpose of this standard, the following terms and definitions shall apply;

3.1 Additives

Additives are substances added to maintain, preserve or improve its quality

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3.2 Composting

A managed process where organic materials are subjected to moisture, heat and microorganisms for a specified period to produce a product known as compost.

3.3 Customer

A business or person who buys or receives produce. For example, a packer, marketing group distributor, wholesaler, exporter, processor, retailer or consumer.

3.3 Crop Period

The time period that elapses from instant of its sowing to the instant of its harvesting.

3.4 Fertigation

Method of applying fertilizers, soil amendments, or other water-soluble products through an irrigation system

3.5 Fertilizer

Organic, synthetic organic, inorganic materials or microorganism whether from natural or synthetic formation to supply plant nutrients by any means or to change chemical, physical or biological properties in the soil to promote plant growth.

3.6 Field Crops

Field crops refers to three main groups of crops; cereal, oil crops and grain legumes.

3.7 Field heat

Heat contained in a crop immediately after harvest

3.8 Fumigation

Application of pesticides in the gaseous form in the enclosed chamber or gas-proof cover (hatch covers) or in any controlled manner to control infestation and/or infection.

3.9 Good Agricultural Practices (GAP)

A collection of principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while taking into account economic, social and environmental sustainability.

3.10 GAP Products

The produce that covers under the scope of GAP certification.

3.11 Genetically Modified Organisms (GMO)

An organism in which one or more genes (called trans-genes) have been introduced into its genetic materials from other organisms using recombinant DNA technology.

3.12 Graded

Classifying the crops into categories based on their quality, size and colour.

3.13 Hazard

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

3.14 High-Risk Products

Food products that support the growth of harmful and potentially harmful micro-organisms and that will not be subjected to any further heat treatment or processing that would remove or destroy such microorganisms prior to consumption.

3.15 Hazardous Substances

Materials or substances whether they are chemicals, microorganisms or microbial toxins that may be harmful to humans, animals, plants, property or environment.

3.16 Hygiene

All conditions and measures necessary to ensure the safety and suitability of an agricultural commodity at all stages of production and fit for consumption.

3.17 Integrated Pest Management (IPM)

The careful consideration of all available pest control techniques and the subsequent integration of appropriate measures that discourage the development of pest populations, and keeps plant protection products and other interventions to levels that are economically justified and reduce or minimize hazards to human health and the environment.

3.18 Intervention

After the use of IPM techniques if monitoring shows threshold is reached then intervention is needed by way of chemical approach.

3.19 Maturity Index

A method used to measure or predict the maturity of crops.

3.20 Maximum Residue Limit (MRL)

The maximum amount of a chemical that is permitted by a competent authority in crops for sale for human consumption.

3.21 Non-Compatible Crops

Crops that have different requirements in temperature, relative humidity and other factors during transport and storage.

3.22 Non- GAP Products.

The products that do not cover under the scope of GAP certification.

3.23 Obsolete chemical

A chemical that is no longer suitable for use. For example, approval for use of the chemical may be withdrawn, the chemical expiry date over, the container may be damaged and the chemical soiled.

3.24 Packaging

Packaging is an enclosing of food to protect it from tampering or contamination from physical, chemical, and biological sources.

3.25 Pest

Living organism such as disease, insect, animal and weed that is injurious to crops.

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3.26 Pesticide

Any substance or mixture of substances of chemicals or biological ingredients intended for repelling, destroying or controlling any pests.

3.27 Pesticide Residue

Any specified substance in food, agricultural commodities or animal feed resulting from the use of a pesticide. The term includes any derivatives of pesticides such as conversion products, metabolites, reaction products and impurities considered to be of toxicological significance.

3.28 Personal Protective Equipment (PPE)

Refers to protective clothing, helmets, gloves, face shields, goggles, facemasks and/or respirators or other equipment designed to protect the wearer from exposure to pesticides and harmful chemicals.

3.29 Planting Materials

Refers to seed or any parts of the plant used for propagation of new plant.

3.30 Potable water

Water that is suitable for human consumption as approved by WHO or equivalent country regulations.

3.31 Producer

The farmer, company or the person legally responsible for the production at farm level.

3.32 Producer Group

A group of farmers coming together as a single unit for implementation and/or certification against the requirements stipulated in the GAP standard.

3.33 Quality

The combination of produce characteristics that are critical to meeting customer expectations and needs

3.34 Recall

A product recall is a process of retrieving defective and/or potentially unsafe goods from consumers.

3.35 Soil Additives

Soil additives are used to improve the physical properties of the soil, such as fertility, water retention, drainage permeability, aeration and soil structure.

3.36 Traceability

Traceability is the ability to track every aspect of manufacturing and distributing a product, from “cradle to grave” or “farm to fork”, allowing producers to track and trace each component that comprises a product, from the suppliers, through the manufacturing process and, eventually, to the final consumer.

4 Document Requirements

4.1 Site Map/Site Details

4.1.1 The crop producer shall maintain an up-to-date site map including the location, access to the site, farm layout, land extent of the farm and adjacent activities. Each farm and production unit shall be referenced on a farm plan or map.

4.2 Traceability and Recall

4.2.1 Production sites shall be identified by a name or code and recorded on a site map.

4.2.2 Packed produce shall be clearly marked with name and identification to enable traceability of the produce to the farm or site where the produce is grown.

4.2.3 Where produce is identified as contaminated or potentially contaminated, the produce shall be separated and prevented from being distributed. If the incidence is found after sale, producer shall immediately inform the buyer.

4.2.4 Effective systems and procedures shall be in place to reduce the risk of wrong labelling or mixing of GAP with non-GAP product(s).

4.2.5 The cause of contamination shall be investigated, and corrective action taken to prevent its reoccurrence and a record of the incident shall be maintained.

4.2.6 A record of sale, information on buyer, and date of delivery and destination including the quantity sold of each produce consignment shall be maintained.

4.2.7 Documents required for assuring the traceability shall be maintained at the farm site.

4.3 Record keeping

4.3.1 Farms shall keep up-to-date records of all the requirements of this standard.

4.3.2 Record keeping system shall be established in which all the essential elements are captured, and all records shall be maintained, and retained for at least 2 years unless stipulated by any specific legislation.

4.4 Internal audit/Inspection

4.4.1 The producer shall have the responsibility to undertake a minimum of one internal self-assessment within the crop period against the requirements of this standard.

4.4.2 The producers shall ensure effective corrective actions taken as a result of non-conformances detected during the internal self-assessment.

4.4.3 The records shall be maintained and produced upon request during the external inspection and kept for a minimum period of two years after the completion of assessment, unless a longer requirement is stated by the competent authority.

4.5 Review of Practices

4.5.1 A review shall be carried out at least once a year to identify new or emerging hazards related to food safety, environment, health and safety of workers, and produce quality, and actions to correct any deficiencies identified and corrective actions taken.

4.5.2 A record of the review undertaken, and corrective action taken shall be maintained.

4.6 Complaints and Redressal

4.6.1 All complaints on all produce not in compliance with the requirements in this standard shall be adequately registered and addressed.

4.6.2 Each farm to address complaints effectively and a record of the same shall be available.

4.7 Training

4.7.1 Farmers and workers shall be trained to have appropriate knowledge in their areas of responsibility related to good agricultural practices and training records shall be kept.

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4.8 Legal

4.8.1 Local regulations should be checked first of all to verify legal compliance.

4.8.2 The land under certification shall either be owned by the applicant, or an agreement between the legal owner of land and the applicant shall be in place granting authorization to applicant to carry out the agricultural operation and certification.

4.9 Visitor Requirements

4.9.1 Any visitors to the farm or place where operations are being carried out in relation to GAP shall follow the practices applicable to farm workers to ensure the safety of the produce as well their own safety.

4.10 Calibration

4.10.1 The producer shall, wherever applicable, have his equipment calibrated as per the legal requirements of the country.

4.11 Group Requirements

This is applicable only if the growers form a group as a single legal entity to adopt the standard as a group. They would require to not only implement the requirements of this GAP standard but also shall need to have an internal control system in place. All the requirements stipulated in this arrangement are required to be written in a formal contract accompanied with policies and procedures for the operation of group.

4.11.1 Legal Requirements

4.11.1.1 Documentation shall be available to demonstrate that the producer group is a registered/legal entity.

4.11.1.2 Producer group shall have a clearly defined structure to implement GAP and own responsibility for production and management of the produce.

4.11.1.3 The administrative/management structure of the producer group shall clearly establish relationship among members of the producer group.

4.11.2 Written Contract

4.11.2.1 A written signed contract shall be available between each member of the group and the group (legal entity), which shall cover individual details, farm details, obligations (to abide by the requirements laid by producer group and the GAP standard, sanctions in case of noncompliance with GAP/any other internal requirements.

4.11.3 Producer Register

4.11.3.1 A register shall be maintained containing details of all members in the group with their current implementation status which shall include details of producer group, registered planting/production area, crops cultivated, details of internal audit and its findings, etc.

4.11.4 Structure of Organization

4.11.4.1 The organization structure shall demonstrate the availability of appropriate resources to carry out operations as per the GAP Standard.

4.11.4.2 The group shall assess key roles and responsibilities for maintaining requirements of the GAP standard.

4.11.4.3 The authority matrix for approval and decision-making shall be defined.

4.11.5 Competency and Training to Staff

4.11.5.1 The group shall assess knowledge and competency requirement of the key personnel managing the group certification such as the trainer, quality manager, internal auditor, group manager, etc.

4.11.5.2 The group shall ensure that all staff assigned to operate the GAP certification is well trained and competent and capable of functioning according to the requirements.

4.11.5.3 The group shall determine knowledge and competency, required training and qualification of designated staff, which shall be well written in line with GAP requirements; shall keep a record on qualifications and training of designated staff.

4.11.5.4 The group shall ensure that internal inspectors are trained and evaluated to ensure compliance with audit procedures and interpretation of GAP requirements of the internal and external auditor.

4.11.6 Quality Manual

4.11.6.1 The group shall develop a Quality Manual to include the scope of certification, the management and internal control, policy and working procedures and policy for member registration and designated members.

4.11.6.2 The Quality Manual shall be periodically verified and updated to ensure compliance with GAP/ other requirements of the producer group.

4.11.6.3 The group shall ensure that the system of updating information and awareness on developments, dissemination and legislative revision in relation to GAP compliance is in place.

4.11.7 Document Control

4.11.7.1 All documents shall be under the document control system.

4.11.7.2 There shall be a master list of all documents as required by the GAP Scheme such as the quality manual, working procedures, instructions, record formats and external origin documents. Records are available to demonstrate effective document control.

4.11.7.3 There shall be a procedure for using external origin documents if used as a part of their operational requirement.

4.11.8 Complaint Handling

4.11.8.1 A procedure for handling of all complaints regarding GAP shall be available which shall cover complaint receipt, registering, problem identification, causative analysis, solution and follow-up.

4.11.8.2 There shall be a defined timeline for complaint handling.

4.11.8.3 Records relating to complaints shall be maintained.

4.11.8.4 There shall be provisions to maintain confidentiality, where applicable.

4.11.9 Internal Audit

4.11.9.1 A system to audit the compliance to GAP of each member, compliance to the requirements of the internal control system of the producer group shall be in place.

4.11.9.2 The competency requirement of the internal auditor shall be defined.

4.11.9.3 A procedure documenting the internal audit procedure by an internal auditor, review and action taken on finding of the internal audit shall be available.

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4.11.10 Non-Compliances, Corrective Actions and Sanctions

4.11.10.1 A procedure for identifying and recording of corrective actions shall be available and implemented. This shall include root cause analysis of non-compliance, responsibilities and time frame for corrective action.

4.11.10.2 The provision of sanctions and infringement shall be a part of the contract between each producer and producer group. Producer group shall have procedures for imposing sanctions on members not complying with requirements. These shall include prompt notification to the Certification Body of suspension or revocation of its registered member.

4.11.10.3 All information pertaining to non-compliance, corrective action, and sanctions shall be recorded.

4.11.11 Product Traceability and Segregation

4.11.11.1 All GAP certified products shall be traceable to each individual registered producer and their farm. Effective systems and procedures shall be in place to reduce the risk of wrong labeling or mixing of GAP with non-GAP products.

4.11.11.2 The harvesting area shall be managed for registered produce so that produce is identifiable and traceable from the purchase order through post-harvest handling, storage and distribution.

4.11.12 Withdrawal of Certified Product

4.11.12.1 A system for product recall and withdrawal shall be in place which is annually reviewed.

4.11.13 Common Pack house

4.11.13.1 If the group has one or more common pack house within their farming operation, then every pack house shall require meeting the GAP requirements.

4.11.14 Agreement with Buyer

4.11.14.1 A written agreement shall be entered into between a group and each of their buyer cautioning misuse of GAP certification claim, as applicable.

4.11.15 Subcontracting

4.11.15 In case subcontractors are used, a subcontracting procedure shall be in place ensuring:

- a) Such external services to be in compliance with GAP requirements;
- b) Assessment of subcontractor competency and records of the same to be maintained; and
- c) Subcontractor to operate in compliance with the group's quality system.

4.11.16 Use of the Bhutan GAP logo

Supervision of the Bhutan GAP logo by the group administration. The registered Bhutan GAP logo is used under the control of the group administration

5 Primary Production Requirements

5.1 Site History and Management

5.1.1 A recording system shall be established on the history of the site, the layout of fields and their crop history.

5.1.2 For all new planting sites, a risk assessment shall be carried out, taking the following into account;

- a) Prior use of the land;

- b) Potential impacts for the production by adjacent crops and areas; and
- c) Potential impact of activities carried out at adjacent areas.

5.1.3 Site history shall be assessed to identify the risk of contamination to crops grown from the previous use of chemical and/or biological hazards on the site or on adjoining sites and the same shall be documented.

5.1.4 Where significant risks are identified, the site shall not be used for fresh produce without first taking some action to manage the risk.

5.1.5 If remedial action is required to manage any risk, a monitoring program shall be in place to make sure that contamination to the produce does not occur and records of the same shall be maintained

5.1.6 Where farms are located on sloppy lands (within the permissible level) and on highly degraded areas, appropriate soil conservation measures shall be undertaken to prevent further degradation, soil erosion and silt deposition into drains and other waterways.

5.1.7 House and farm animals shall be kept out of the production site.

5.1.8 The required catchment area shall be protected when the farm is located near the reservoirs or natural water bodies.

5.2 Planting Materials

5.2.1 The planting material shall be free of visible signs of pests and diseases.

5.2.2 If planting material is produced on the farm, a record shall be kept of any fertilizers and/or chemicals used and the reason for usage.

5.2.3 If treatments are carried out on planting materials, such treatments shall be justified and the records shall cover the treatments with date, trade name, active ingredient, name of the operator, method of application, and dosages.

5.2.4 Planting materials shall be obtained from reliable or certified sources, and shall maintain the records on variety purity, variety name, batch number, and supplier, traceable to their sources and history.

5.2.5 If planting materials are treated with additives/pesticides (fungicides, insecticides, biocides and/or others), these shall be approved and as per recommended technology by the competent authority.

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

5.2.7 Varieties used for planting in the farm should preferably possess resistance or tolerance to major pests, so as to minimize utilization of pesticides.

5.2.8 The planting material should also be selected based on compatibility with soil type and soil fertility so that the use of additional nutrient supplying chemicals is avoided.

5.2.9 Planting materials that are known to be poisonous for consumption shall not be grown unless there is the recommendation on the proper way to consume.

5.3 Soil and Substrate Management

5.3.1 The production practices adopted shall be suitable to the soil type and not increase the risk of environmental degradation.

5.3.2 Soil maps should be used to plan crop rotation and production programs, where necessary to increase the soil fertility.

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5.3.3 Cultivation practices that improve or maintain soil structure and minimize soil compaction and erosion should be adopted.

5.3.4 For the preparation of growing media, preference shall be given to the use of natural substrates such as mixture of sand, top soil, coir dust, cow dung or compost.

5.3.5 Mulching and shading shall be practiced to maintain favorable soil moisture and soil temperature, and for weed control.

5.3.6 The location of sterilization shall be kept confined. Solarization shall be the preferred option of sterilization.

5.3.7 The use of chemical fumigants to sterilize soils, potting media and substrates shall be justified and recorded.

5.3.8 Recommended sterilization methods shall be followed.

5.4 Fertilizer and Additives

5.4.1 The soil health care plan and nutrient loss strategy shall be developed to minimize the nutrient losses.

5.4.2 The type, quantity, method, timing and frequency of fertilizer application shall be carefully observed so as to maximize benefits and minimize losses.

5.4.3 Crop producers shall not use untreated solid or liquid manure to avoid the risk of chemical and microbiological contamination.

5.4.4 In cases where the farm produces its own organic inputs, proper treatment procedures shall be adopted to reduce or eliminate pathogens present in the raw material and to minimize the probability of contaminating the product. Records of treatment procedures, including the raw materials used shall be kept.

5.4.5 The location of the composting site shall also consider the slope and its proximity to crop production sites in order to prevent cross contamination from run-off or leaching. Composting area shall be located at the lowest catena of the crop production site.

5.4.6 Organic and inorganic fertilizers shall be used as per the recommendation of competent authority to optimize yield and minimize the negative impacts on human health, the environment and the quality of the produce.

5.4.7 Fertilizers and soil additives shall be applied based on the soil analysis as recommended by the competent authority.

5.4.8 All applications of soil and liquid fertilizers shall be recorded and shall include location of application, origin and composition of fertilizers, date of application, type and quantity of fertilizer applied, method and frequency of application and name of the operator.

5.4.9 Fertilizer application machinery shall be kept in a good working condition/sanitized and calibrated to ensure the correct quantity is applied.

5.4.10 Fertilizer stock records shall be maintained and made available for inspection.

5.4.11 Fertilizers shall be labelled and stored in a protected, clean, dry location in a way not contaminating the environment

5.4.12 Fertilizers shall not be stored with farm produce or products from the risk of chemical and biological contamination.

5.4.13 Organic and inorganic fertilizers shall be stored and handled in an appropriate manner to reduce the risk of contamination to farm produce/ products and the environment.

5.4.14 Untreated human sewage sludge shall not be used.

5.4.15 Fertilizers and soil additives shall be selected and applied so as to minimize the risk of nitrate leaching or heavy metal contamination to the produce.

5.4.16 A proper account shall also be taken care of the nutrient contents in organic fertilizers and the use of organic fertilizers in cultivation shall be based on nutrient management plans.

5.4.17 For hydroponic production systems, the nutrient mixing, application and disposal of the nutrient solution shall be monitored and recorded.

5.4.18 Records shall be maintained for fertilizers and soil additives detailing the source, product name, date and quantity obtained and also for the application detailing the date, name of product, rate and method of application and name of the operators.

5.4.19 The inorganic and organic fertilizers shall be stored separately from harvested farm produce.

5.4.20 Producers or operators shall be trained on safety measures and proper handling/application of inorganic and organic fertilizer along with the other requirements related to soil and nutrient management practices.

5.5 Water

5.5.1 The water available for irrigation/fertigation should be free from harmful contaminants.

5.5.2 Assessment of the source of water used for irrigation, application of chemicals or handling, washing, treating the produce or cleaning and sanitation shall be done at least annually to minimize the risks of chemical and biological contamination and records shall be kept.

5.5.3 Where water testing is required to assess the risk of contamination, tests shall be conducted at a frequency appropriate to the conditions impacting on the water supply and records shall be maintained.

5.5.4 Where a significant risk is identified, either a safe alternative water source shall be used or the water treated before use. Untreated sewage water shall not be used during production or for post-harvest handling. Where treated water is permitted, the water quality shall comply with the Water Act, Water Regulations of Bhutan, and relevant laws.

5.5.5 Irrigation shall be based on crop water requirements, availability of water and soil moisture levels. The irrigation system shall be checked and maintained in good condition to ensure its efficiency during irrigation and to minimize wastage of water.

5.5.6 Water collection, storage and use shall be managed in accordance with the Water Act of Bhutan, Water Regulations of Bhutan, and relevant laws.

5.5.7 A record shall be kept of irrigation/fertigation use, detailing crop, date, location and volume of water irrigated or duration of irrigation.

5.5.8 Water used for dissolving fertilizers and pesticides shall have quality that does not decrease the effectiveness of such inputs.

5.5.9 The farmer shall maintain irrigation equipment as per the manufacturer's guidelines/ manual.

5.5.10 The farmer shall employ adequate measures to prevent flow of water into the fields from undesirable sources like municipal landfill areas, hospital and industry waste dump areas, etc.

5.5.11 To minimize the risk to the environment, any water discharge or waste water shall be treated.

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5.5.12 A water management plan to optimize water usage and reduce waste shall be made available.

5.5.13 Regularly change water for crop production in hydroponic system. In case of reuse, there shall be a system to reduce the amount of microbial and/or chemical contamination.

5.6 Chemicals (Plant Protection Products or Other Agro and Non-Agrochemicals)

5.6.1 Non-chemical pest control measures shall be preferred over chemical pest control measures. The chemical pesticides used shall be minimal.

5.6.2 Wherever possible, crop producers shall apply recognized Integrated Pest Management (IPM) techniques provided by the competent authority. Crop producers shall seek advice on IPM from the competent authority.

5.6.3 A rotation strategy for chemical application and crop protection measures should be used to avoid pests and diseases resistance.

5.6.4 Weeds shall be controlled to the level that it does not have an adverse effect on the growth of crop.

5.6.5 Information and updates on the maximum residue limits (MRL) as specified in the Codex standards or the importing country's standards where the produce is to be traded shall be made available.

5.6.5 Choice of Pesticides

5.6.5.1 The producer shall use only the chemicals and bio-pesticides that are approved as per the Pesticides Act of Bhutan and, Pesticides Rules and Regulation of Bhutan.

5.6.5.2 Producer, in any case, shall not use the pesticides prohibited to import or use, under the Pesticide Act of Bhutan and, Pesticide Rules and Regulation of Bhutan.

5.6.5.3 For crops to be exported, crop producers shall further ensure not to use the pesticides that are banned or disallowed in importing countries

5.6.5.4 Chemicals shall be purchased only from the supplier authorized by the competent authority.

5.6.5.5 The producer shall maintain crop sanitation and quarantine activities at all times. The infected plant parts shall be burned outside the planting site by considering the impact to environment.

5.6.5.6 The producer shall not mix more than two pesticides unless it is recommended by the competent authority or supported by scientific information

5.6.5.7 In the integrated cropping system, the producer shall ensure that pesticides applied on other crops shall be carried out avoiding any direct contamination of the target crops.

5.6.5.8 The application of chemicals (ground and aerial) shall be managed to minimize the risk of spray drift to neighboring properties and environmentally sensitive areas.

5.6.6 Records of Application and Storage

5.6.6.1 The records of plant protection products shall be kept and maintained for inspection.

5.6.6.2 A record of chemicals held in storage shall be maintained detailing chemical name, date and quantities procured and date of complete use or disposal. The producer shall be obtained purchase receipt from the suppliers while purchasing the pesticides.

5.6.6.3 Producer shall record all the details while spraying the pesticides such as name of crop, location and date of application, reason for application, name of pesticide (common name and the trade name) used, dosage, method of application and name of the operator

5.6.7 Training and Safety Instructions

5.6.7.1 Producer or operators shall be trained on safety measures and proper application of pesticides including accident and emergency response measures, first-aid practices, safe use of chemicals and personal hygiene.

5.6.7.2 The producer or operator shall strictly adhere to the safety instruction provided by the competent authority or the safety instruction written on the pesticides label.

5.6.7.3 Chemical shall be handled and applied by trained workers with appropriate knowledge and skills.

5.6.7.4 Safety instructions shall be provided to workers and displayed in appropriate and readily accessible places.

5.6.7.5 Producer shall mark each area of application with appropriate warning signs of the re-entry period. The sign board should display all the required information such as name of pesticide sprayed, date of spray and restricted-entry interval.

5.6.7.6 A facility along with first-aid measures shall be available and accessible to treat workers in case of injuries and accidents.

5.6.7.7 Emergency instructions shall be documented and placed in prominent places within the chemical storage area.

5.6.7.8 The spraying operator shall take bath with soaps and change clothes right after pesticide application. Used clothes shall be cleaned every time and separated from the normal laundry.

5.6.7.9 The application of suitable Integrated Pest Management and avoidance of use of inorganic chemicals shall be implemented.

5.6.8 Personal Protective Equipment

5.6.8.1 Producers or operators shall be equipped with suitable personal protective equipment (PPE) recommended by the competent authority.

5.6.8.2 Personal protective gear shall be cleaned after use, minimizing environmental contamination and stored separately from pesticides.

5.6.8.3 The workers who are handling and applying chemicals or entering newly sprayed sites shall always be equipped with suitable protective clothing and equipment.

5.6.9 Crop producers shall be strictly adhered to pre-harvest intervals or waiting period prescribed in pesticide product labels or recommended by competent authority. Producers shall not harvest the crop before waiting period is completed.

5.6.10 Spray Equipment

5.6.10.1 Spray equipment shall conform to the recommendation of the competent authority.

5.6.10.2 Equipment for applying chemicals shall be maintained in good working condition and checked for effective operation by a technically competent person.

5.6.10.3 The producer shall not use the equipment if there is a leakage or any other technical issue that can compromise the safety of the operator.

5.6.10.4 Equipment used for chemical application shall be properly cleaned and securely stored.

5.6.11 Disposal of Surplus Spray Mix

5.6.11.1 Appropriate volumes of chemicals shall be mixed to minimize the amount of surplus chemical after application.

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5.6.11.2 Surplus spray mix and tank washings shall be disposed of with utmost care. It shall be disposed off in a manner that minimizes the risk of environmental harm on and off the site. The surplus chemical can be sprayed on the treated part of the crop as long as the recommended dosage has not been exceeded or on designated fallow land away from water sources.

5.6.12 Pesticide Storage

5.6.12.1 Pesticides shall be stored in a secured, water-resistant, well-ventilated and well-lit location which is located and constructed to minimize the risk of contaminating produce.

5.6.12.2 Pesticides shall be kept away from the reach of children, animals or differently abled person. Keys and access to the store/box shall be limited to workers with adequate knowledge on the handling of pesticides.

5.6.12.3 The producer shall place hazards and warning signs of potential dangers on access doors.

5.6.12.4 Only the pesticides that are recommended and registered for use on crops on the farm shall be stored. Producer shall not store pesticides more than what is required for a particular year. Solid pesticides shall be stored on shelves above liquids or stored separately.

5.6.12.5 Chemicals should be stored in their original containers with legible labels and instructions from competent authorities. If chemicals are transferred to another container, the new container shall be clearly marked with the brand name, dosage of use, and withholding period.

5.6.12.6 Types of pesticides shall be orderly grouped in the specified secure storage to prevent mishandling, contaminating to produce and harming to personnel.

5.6.12.7 Other chemicals such as fuel, cleaning agents, and other non-agricultural substances shall be orderly stored to prevent exposure to produce and contamination to the environment.

5.6.13 Empty Pesticide Containers

5.6.13.1 Empty pesticide containers shall not be re-used except for containing and transporting identical pesticide products.

5.6.13.2 The disposal of empty pesticide containers shall be in a manner that prevents exposure to humans and contamination of the environment. Disposal or destruction of containers shall be in accordance with the guidelines prescribed by the competent authority.

5.6.13.3 Empty containers shall be rinsed at least three times with water and the washings are returned to the spray tank before disposing.

5.6.14 Expired or obsolete chemicals shall be identified clearly, kept in secure places and disposed off through official collection systems.

5.6.15 Over Use of Pesticides

5.6.15.1 In case there is evidence or doubt of improper use, the produce shall be analyzed for pesticide residues by either official or accredited laboratory. Record shall be kept as evidence.

5.6.15.2 In case the result of pesticide residue analysis exceeds the maximum residue limits under the relevant standards or laws, the incident shall be investigated and corrective action shall be taken or preventive measures shall be in place to avoid the reoccurrence. Such record shall be kept as evidence

5.7 Post-Harvest Handling

5.7.1 Harvesting and Handling

5.7.1.1 The post-harvest handling should be done in accordance with BTS 139: 2020 SARS 0014: 2018 Bhutan Standard on Food hygiene- General practices- Code of practice.

5.7.1.2 A maturity index shall be used to determine the appropriate time to harvest produce.

5.7.1.3 The produce shall be harvested following appropriate methods and care to minimize damage.

5.7.1.4 Harvesting should be avoided during unfavorable weather.

5.7.1.5 Harvested produce shall not be placed directly on the ground.

5.7.1.6 Newly harvested produce shall not be mixed with any of the previously harvested produce.

5.7.1.7 Harvested produce that are damaged, bruised, diseased, pest and insect infested, and of inferior quality shall be separated and removed.

5.7.1.8 Harvested produce shall be removed from the field as quickly as possible and placed in the shade if a delay occurs before transport, unless sun drying is required.

5.7.1.9 Where produce is field packed, packaging shall not be left in the field overnight where risk of contamination exists.

5.7.1.10 Produce shall be graded and packed according to market requirement.

5.7.1.11 Protective materials shall be used where required to protect produce from rough surfaces of containers and excessive moisture loss.

5.7.1.12 Field heat should be removed using appropriate cooling methods.

5.7.1.13 Measures shall be taken to prevent the presence of pests in and around handling, packing and storage areas.

5.7.1.14 In case if bait or trap is used to control pest, they shall be placed in the area that does not cause risk of contamination to produce, containers and materials. The record shall be kept.

5.7.1.15 Pets/Animals shall be prevented from entering into the operation area, particularly the sites for harvest, sorting, packing and storage. In case of risk, preventive measures shall be provided.

5.7.1.16 All product packing and storage sites shall have adequate pest control measures, particularly in the working areas and storage areas for packaging materials, pesticides and fertilizers.

5.7.1.17 Precautions shall be taken to minimize rapid weight loss after harvesting with appropriate storage practices.

5.7.2 Equipment, Containers and Materials

5.7.2.1 Equipment and containers used for harvesting and handling operations shall be kept clean and hygienic.

5.7.2.2 Equipment, containers and materials that come in direct contact with the produce shall be non-toxic, non-contaminating and, easy to clean and disinfected.

5.7.2.3 The containers used for storage of chemicals, wastes and other dangerous substances shall be prohibited for holding, packaging and storage of the produce.

5.7.2.4 Equipment, materials and containers shall be kept in areas separate from chemicals, fertilizers, soil additives and other substances to avoid cross contamination.

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5.7.2.5 Reusable equipment, materials and containers shall be checked for its soundness and cleanliness before use, and cleaned, maintained or repaired. A record of cleaning should be kept.

5.7.2.6 Equipment, materials and containers that are damaged and can no longer be kept in hygienic condition shall be discarded.

5.7.2.7 In case there is risk from physical contamination arising from tools and equipment, preventive measures shall be provided.

5.7.2.8 Agricultural produce from conventional agriculture shall not be packed together with GAP-certified and GAP-labeled products.

5.7.3 Structures or Facilities

5.7.3.1 Structures or facilities used for growing, handling, packing and storage of produce shall be constructed and maintained to minimize the produce from getting contaminated.

5.7.3.2 Sewage, waste disposal and proper drainage systems shall be constructed to minimize the risk of contaminating production site, water supply and produce.

5.7.3.3 Grease, oil, chemicals, fertilizers and other farm machineries shall be segregated from areas of handling, packing and storage areas to prevent contamination.

5.7.3.4 Lights where produce and materials kept are exposed shall be shatter proof or covered with a shatter proof cover. In the event of a light break, the produce shall be discarded and equipment and materials cleaned.

5.7.3.5 Where equipment and tools that may be a source of physical hazards to the workers are located in the same building as handling, packing and storage areas, the equipment and tools are separated with a physical barrier or not operated during handling, packing and storage of produce.

5.7.4 Post-Harvest Treatment

5.7.4.1 The quality of water use for post-harvest treatment of produce shall be equitable to that of drinking water laid out in the Water Act of Bhutan and relevant laws.

5.7.4.2 Use of additives as post-harvest treatment should be minimized. When additives are used, they shall be in accordance with the national standards or law.

5.7.4.3 The application, storage, and disposal of chemicals used after harvest, including pesticides and waxes, requirements under the clause 5.6 shall be followed

5.7.4.4 Crop producers, post-production handlers, packers and exporters shall be able to demonstrate competence and knowledge with regard to the post-harvest treatment.

5.7.4.5 For crops to be exported, crop producers, post-production handlers, packers and exporters shall not use post-harvest treatment chemicals or pesticides that are banned or disallowed in importing countries.

5.7.4.6 Specific test on produce should be included if required by an importing country.

5.7.4.7 Source of water for post-harvest washing shall be analyzed at least once a year or as per the requirement of the law for microbial, chemical and inorganic pollutants to ensure that it is potable and safe.

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

5.7.5 Storage and Transport

5.7.5.1 For long delays before transport, produce should be held within the suitable temperature of the produce.

5.7.5.2 Produce shall be stored and transported separately from goods that are potential sources of chemical, biological or physical contamination.

5.7.5.3 Mixing of non-compatible crops during transport should be avoided.

5.7.5.4 Storage site shall be clean, cool, hygienic, not be exposed to direct sunlight with good ventilation, free of heat accumulation, and be able to prevent contamination by hazardous substances.

5.7.5.5 Produce should be protected with a cover during transportation and overloading should be avoided.

5.7.5.6 Containers or materials filled with produce shall not be placed in direct contact with the ground, where there is a significant risk of contaminating the produce. Pallets, if used, shall be checked for cleanliness, chemical spills, foreign objects and pest infestation, and rejected if there is any risk of contaminating the produce.

5.7.5.7 Vehicles used for transporting produce shall be kept clean and maintained in good condition. These shall be checked before loading for cleanliness, chemical spills, foreign objects and pest infestation.

5.7.5.8 Produce should be transported to the destination as soon as possible before the quality deteriorates.

5.7.6 Waste and Pollution Management.

5.7.6.1 While addressing these, consideration should be given to the National Environmental Policy or relevant laws of the country.

5.7.6.2 All possible waste products produced by the production processes should be identified in all areas of the business.

5.7.6.3 The potential sources of pollution (e.g., fertilizer excess, exhaust smoke for heating units etc.) should be identified and documented.

5.7.6.4 Adequate precautions shall be taken to ensure these wastages are disposed off in a manner that will not contaminate plants and humans, and not constitute a health hazard to consumers of the final product.

5.7.6.5 Whenever possible, reduction of waste generated from the production activities shall be practiced and, crop debris and waste shall be composted and re-used for soil conditioning, and shall be burnt outside the production site.

5.7.6.6 The waste management plan should be implemented and documented, and there are visible actions and measures at the farm that confirm that the objectives of the waste and pollution action plan are being carried out.

5.7.6.7 The farm and premises should be clear of litter and waste to avoid establishing a breeding ground for pests and diseases in areas of waste/litter in the immediate vicinity of the production or storage buildings which could result in food safety risk.

5.7.6.8 The premises should have adequate provisions for waste disposal and designated areas to store litter and waste, where different types of waste are identified and stored separately. Empty chemical containers shall be rinsed with water, crushed and stored in a secure area or room until disposal unless they are returnable to the distributor or disposed off as recommended by the competent authority.

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6 Worker Health, Safety and Welfare

6.1 There shall be an action plan to promote safe and good working conditions. Workers who are handling produce shall be medically screened as per the legal requirements.

6.2 Personal Hygiene

6.2.1 Farmers and workers shall be trained on personal hygiene practices for ensuring his/her own health and well-being. The records of training shall be kept.

6.2.2 Written instructions on personal hygiene practices shall be provided to workers and displayed in prominent locations.

6.2.3 Medical check-up of workers shall be done annually and records kept for 5 years. Toilets and hand and body washing facilities shall be readily available and maintained in a hygienic condition.

6.2.4 Sewage shall be disposed off in a manner to minimize the risk of contamination to workers.

6.2.5 Any serious health issue is to be reported to the appropriate authority and necessary precautions shall be taken to reduce the risk of contamination to produce.

6.3 Working Conditions

6.3.1 Working conditions are suitable for workers and protective clothing shall be supplied where conditions are hazardous to workers.

6.3.2 All farm vehicles, equipment and tools, including electrical and mechanical devices, shall be adequately guarded and maintained and inspected on a regular basis for potential hazards to users.

6.3.3 Safe manual handling practices shall be followed to minimize the risk of injury from lifting heavy objects and excessive twisting and reaching movements.

6.3 Worker Welfare

6.3.1 The minimum working conditions including working hours and minimum wages shall comply with the Labour and Employment Act of Bhutan and relevant laws.

6.3.2 A member of management shall be identified as responsible for workers health, safety and welfare.

6.3.3 Regular two-way communication meetings should take place between management and workers for which records are kept and maintained

6.3.4 Workers shall not be exploited because of gender, age or other reasons

6.3.5 Where provided by an employer, living quarters and work place shall be suitable for human habitation and, contain basic services and facilities.

6.4 Training

6.4.1 Workers shall be trained in safety requirements (Safety Drill), accident and emergency response measures, first – aid practices, safe use of chemicals and personal hygiene. These procedures shall be displayed in the appropriate language for the workforce. Instructions shall be supported by warning signs and symbols where appropriate.

6.4.2 Workers shall undergo training in basic food hygiene and safety before handling produce.

6.4.3 Workers shall also be provided appropriate training in areas of their responsibility such as vehicles, tools and equipment operation, handling and application of chemicals.

6.4.3 Training programs related to the environmental education and awareness, and human – animal coexistence shall be organized for all personnel working in the farm.

6.4.4 Records of training for each employee shall be kept.

6.4.5 The training needs shall be reviewed once a year.

7 Environmental Issues

7.1 Impact of Farming on the Environment

7.1.1 Crop producers shall conform to existing national environmental policy or relevant laws. This covers the concern for air, water, soil, biodiversity and other environmental issues.

7.1.2 The grower should understand and assess the impact his/her activities have on the environment. The grower should be able to demonstrate his/her knowledge and competence with regards to minimizing the potential negative impact, such as nutrient loss, of the growing activity on the local environment

7.1.3 The grower should consider how he/she can enhance the environment for the benefit of the local community, and flora and fauna.

7.2 Wildlife and Biodiversity Conservation

7.2.1 The production plan shall comply with the National Biodiversity Act of Bhutan, National Biodiversity Strategy and Action Plan, and relevant laws covering protected plant and animal species and to preserve native plant and animal species, including native vegetation areas, wild life corridors and vegetation areas on or near the bank of water ways.

7.2.2 Measures shall be applied to control/protect feral animals

7.3 Unproductive Sites

7.3.1 The grower should consider for the conversion of unproductive sites into conservation areas where viable.

7.4 Energy Efficiency

7.4.1 The use of electricity and fuel should be reviewed to ensure that efficient operation practices are implemented to minimize the use of energy.

7.4.2 The use of renewable energy sources should be encouraged.

7.4.3 Machine and equipment shall be maintained in good condition to ensure the efficiency of operation and to save energy.

7.5 Air/Noise

7.5.1 If an offensive odor, or smoke, dust or noises are generated from production practices, management action shall be taken to minimize the impact on neighboring property and surrounding areas.

8 Marking and/or Labelling Requirements

8.1 The following shall be marked or labeled legibly and indelibly on each package/container to cover GAP and general labeling requirements:

- a) Name of the produce or product
- b) Grade (quality/ size)
- c) Name, address, identification number of the crop producer
- d) batch code/QR code/bar code or any decipherable code marking
- e) Net quantity

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- f) Date of packing
- g) Date of expiry/ best before
- i) Storage condition.
- k) Stamp or any other marking by certified producer

8.2 The marking and labeling shall also be in accordance with BTS 268 CODEX STAN 1-1985 Bhutan Standard on Labelling of prepackaged foods

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FOOD AND AGRICULTURE TECHNICAL COMMITTEE (TC 02)

<i>Organization</i>	<i>Representative(s)</i>
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Bhutan Agriculture and Food Regulatory Authority, Thimphu	Mr. Kubir Nath Bhattarai (Alternate)
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Bhutan Agro Industries Limited, Thimphu	Mrs. Saraswati Urao (Alternate)
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Department of Agriculture, MoAF	Mr. Bal Bahadur Rai (Alternate)
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National Post Harvest Centre, Paro	Mr. Dechen Tshering
Office of Consumer Protection, MoEA	Mr. Jigme Dorji
Office of Consumer Protection, MoEA	Mr. Chencho Zangmo (Alternate)
Bhutan Standards Bureau, Thimphu	Mr. Sherab Tenzin, Director General (Ex-officio member)

Member Secretary

Cheki Zangmo

Standardization Division

Bhutan Standards Bureau

SUBCOMMITTEE ON GAP (TC02/SC11)

Organization	Representative(s)
Department of Agriculture, MoAF, Thimphu	Mr. Jigme (Chairperson)
Bhutan Agriculture and Food Regulatory Authority, MoAF, Thimphu	Ms. Yeshe Lhamo
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Member Secretary

Cheki Zangmo

Standardization Division

Bhutan Standards Bureau

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