GLOBALG.A.P. Generic HACCP Food Safety Plan for the Integrated Farm Assurance Standard Version 6 GFS Fruit and Vegetables

General Guidance

ENGLISH VERSION 6

TABLE OF CONTENTS

1 INTRODUCTION

As defined by the Codex Alimentarius, the Hazard Analysis and Critical Control Point (HACCP) system is a science-based and systematic approach that identifies specific hazards and measures for their control to ensure the safety of food. Furthermore, section 1.1. of the Codex Alimentarius states “HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing.”

Managing risk through the identification and mitigation of defined HACCP is widely recognized as an effective strategy for food production and processing operations.

HACCP is an organized system designed to identify hazards and produce a structured plan to reduce potential risks. The emphasis of HACCP in food production systems is to help prevent food safety problems by focusing on controllable elements in the food production process and carrying out corrective actions in a timely manner. The HACCP plan is a working document that should be referenced, regularly reviewed, and updated whenever there is a significant change in a process that may alter hazards into the operation.

Contamination of food products may be biological (e.g., *Salmonella* or *E. coli*), chemical (e.g., allergens or pesticide residue), physical (e.g., metal or glass), and radiological. A HACCP system identifies potential contaminants and considers the consequences for food safety if a contaminant was present.

Hazard Analysis

Examples of contamination:

Physical	Chemical	Microbiological	Radiological
Metal	Plant protectant residues	Pathogenic bacteria	Contaminated soils
Glass	Cleaning products	Parasites	
Hard plastic	Post-harvest treatments	Viruses	
	Allergens	Fungi	

HACCP systems identify the points in the production and handling process where hazards may occur. Steps within the process that are considered critical in preventing, reducing, or eliminating hazards are labelled as **Critical Control Points (CCPs)**, and monitoring is carried out for each defined control. Critical limits are set for each CCP, defining what is and is not acceptable, and control measures are established with instructions on actions to be taken when critical limits have been exceeded.

To design a HACCP system, the method established and recommended internationally by the Codex Alimentarius working group is based on twelve stages. The first five steps are the prerequisite stages, while the other steps correspond to the seven core HACCP principles.

1) Forming a HACCP team

2) Product description

3) Identification of intended use

4) Process flow diagram

5) Confirmation of process flow diagram on site

6) Conduct a hazard analysis

7) Determine the CCPs

8) Establish critical limits

9) Establish a monitoring system

10) Establish corrective actions

11) Establish verification procedures to confirm HACCP system functions appropriately

12) Establish documentation and records concerning all procedures.

The system is proactive, alerting operators to take mitigating actions before problems escalate.

Standard Operating Procedures (SOPs) are generally regarded as one of the prerequisites for HACCP plan development. Good hygiene practices and prevention of cross contamination are two significant factors that must be addressed for an effective HACCP plan. Also important are good sanitation and hygienic equipment design. The objective is to manage primary production to reduce the likelihood of introducing a hazard that may adversely affect the product. Recordkeeping and training are required.

2 PURPOSE AND SCOPE OF A HACCP PLAN

2.1 Purpose

This generic HACCP plan was prepared as a reference document using the Codex Alimentarius Commission guidelines for the application of the HACCP method. The purpose is to demonstrate that the GLOBALG.A.P. Integrated Farm Assurance Standard for Fruits and Vegetables Version 6 GFS incorporate the Codex Alimentarius HACCP elements in the assessment framework. This document will focus only this specific standard, version and scope. Additional documents will be revised and revised to include additional standards that are currently undergoing revision, including the GLOBALG.A.P. Combinable Crops, Crops for Processing, Harmonized Produce Safety Standard, and the Produce Handling Assurance Standard. Additionally, a more thorough treatment of elements of hop and tea production may be revised for the future version, depending on market need.

2.2 Scope

1) The scope of the HACCP plan is defined per product, product category and relevant processes associated with the product. Guidance applicable to operations growing and handling fresh fruit and vegetables, combinable crops and hop are described below. The processes involved in an operation may include land preparation, purchase of plant propagation materials, growing, harvesting, handling, and packing. There are some processes that are specific to particular product and are not included in this sample HACCP plan.

2) The description and intended use of the products grown by the operation are discussed in greater detail, with a supporting flow diagram outlining the relationship between the specific production stages and their respective control points are listed in tables. There may be some processes that are specific to particular produce and are not included in this generic HACCP plan. It is assumed that the business employs a responsible person to oversee the food safety program and identifies staff with key responsibilities impacting food safety and specific control points.

3) Food safety hazards are defined as biological, chemical, physical, and radiological contamination of produce. There may be some hazards that are specific to a particular geographic location or different types of produce that may not be specifically covered in this sample outline of a HACCP plan. The operation must include potential hazards applicable to its own unique operation.

3 HACCP TEAM

The analysis and identification of risks have been performed internally by the GLOBALG.A.P. Technical Team consisting of the Managing Director, Senior Technical Expert and Technical Key Account Managers. The Crops Technical Committee evaluated the plan and the development of the standard is based on the hazard analysis report as well as their expertise and practical experience, as well as industry requirements.

4 PRODUCT DESCRIPTION AND INTENDED USE

4.1 Product description

Product descriptions may vary according to the type of produce and products covered in the food safety program. The requirements for harvesting, handling, packing, and storage are described in documentation available as part of the food safety program and may be supported by requirements issued by the buyer, accepted industry standards, product grading specifications, or other applicable documentation.

The food safety information collected as part of many fresh produce operations with HACCP plans includes:

1) Testing product for maximum residue limits (MRL) resulting from agronomic chemical applications and, when deemed applicable in the risk assessment, the presence of metals in compliance with maximum permissible concentration (MPC) are important elements of a HACCP plan, and may be required by buyers.
2) Evaluation of detectable microbiological contamination at key stages of the operation should be recorded. Records should include frequency of testing and corrective actions associated with exceedance values.
3) Evaluation of methods to reduce biological, chemical, physical, and radiological hazards at key points in the operation should be completed. While general quality specifications may be included in written specifications for the product, only food safety information is relevant to the HACCP procedures. In some instances, quality issues may also result in an increased risk to food safety.
4) Reference to Product categories based on risk is incorporated.

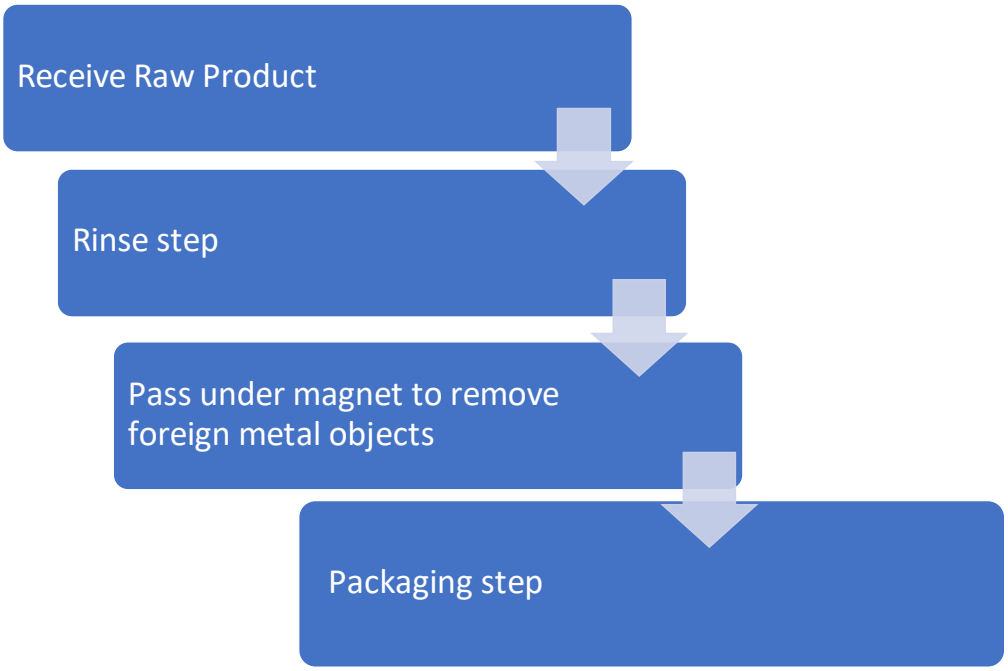
4.2 Intended use

Produce may be defined as a ready-to-eat food products or may undergo further processing. Produce may follow various paths through the food supply chain before reaching the final consumer. Possible avenues include:

1) Wholesalers, retailers, and food service businesses for sale to consumers.
2) Processors and food service businesses for preparation of food products.

4.3 Process flow diagram

A process flow diagram can be presented in a number of ways. To begin, think about the way in which product flows through your operation. This will include all elements of handling, packaging and perhaps even shipment. While the product is within your control, think about how it moves through each step in the process. These steps can be represented as pictures, diagrams with written descriptions, photographs, or other descriptions. Many examples of process flow diagrams for HACCP plans are available online. The below is an extremely basic example of what a simple process flow diagram may look like for produce moving from the field into a packinghouse. The expectation is that the diagram is simple enough to be easy to follow each step, but comprehensive enough that each stage of the process is clearly identified.



The Government of Canada has archived versions of HACCP flow diagrams for fruits and vegetables that are more detailed and comprehensive. These may be accessed here: https://inspection.canada.ca/food-safety-for-industry/archived-food-guidance/safe-food-production-systems/haccp-generic-models-and-guidance-documents/generic-model-fresh-cut-vegetables/eng/1371034721098/1371034722410?chap=4 Researching flow diagrams associated with the specific types of production and product produced is encouraged, as many examples are available online through industry sources.

5 HAZARD ANALYSIS

5.1 Analysis

Each process in the flow diagram must be analyzed, taking into consideration these elements:

1. Potential hazards for the produce should be identified and a schematic of the operation layout used to assess the risk for each unique operation by looking at various movement patterns including raw material, inputs, product, process, equipment, environmental risks, water usage, and waste flow. Written specifications shall be established, implemented and maintained for all inputs to the process, including services that are purchased or provided and that have an impact on food safety.
    a. Specific process stages that pose a risk for direct or indirect contamination the finished product must be identified. The HACCP may consider if the commodity is a ready-to-eat product or not. Regardless of intended end use, mitigating steps should be noted that are crucial in preventing contamination events.
    b. As a producer may not always know the end use of the product at the point of sale, it is important to control risks appropriate to the highest risk scenario for each individual commodity. For example, a producer may send some apples to a processor for making into juice, and other apples will be sold at a local market. The HACCP must include an analysis of hazards for the possible end uses.

2. Appropriate labeling and product segregation should be used when applicable and when cross-contamination is a possibility.
3. The potential causes or source of the hazard should be identified.
4. An assessment should be conducted to determine the significance of the identified hazards.
5. Control measures should be established for the identified hazards.

5.2 Potential hazards

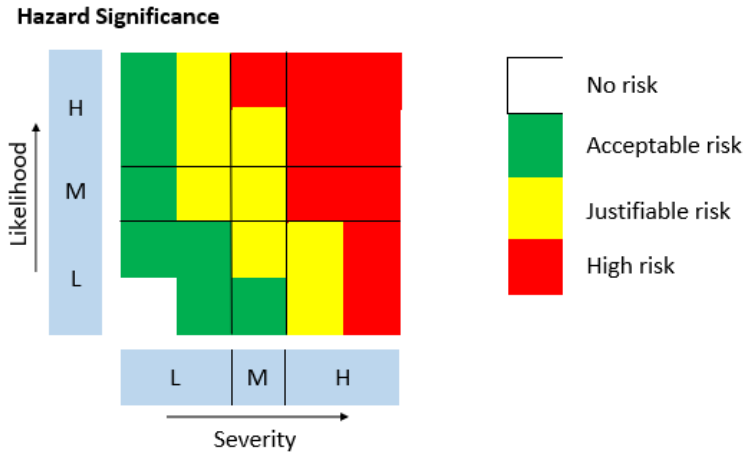
The potential hazards are categorized according to the type of contamination, which include biological, chemical, physical and radiological hazards. There may be hazards that are specific to particular types of produce and are not described in the sample HACCP outline below, but which need to be assessed as part of the risk assessment for each individual operation.

5.2.1 Source of hazards

The sources of hazards may include, but are not limited to, the raw materials, equipment, storage conditions, growing and handling practices, on-farm transport, and sanitation.

5.2.2 Hazard significance

The significance of a hazard is assessed by considering the severity and likelihood of the hazard occurring. The line of reasoning used to determine the severity score should be documented. The overall risk rating may be determined using a risk assessment tool with a scale of high (H), moderate (M) and low (L). As each operation is unique, a producer must determine what specific hazards are a high, moderate or low risk for their operation, based on the likelihood of occurrence and implications to human health.



Severity of occurrence of incident:
L (very low to low) – very little effect (acceptable)
M (medium) – medium effect (unacceptable)
H (high) – strong effect (unacceptable)

Likelihood of occurrence of incident:
L (very low to low) - risk is cogitable, occurrence is rather impossible
M (medium) – risk is cogitable, occurrence is possible
H (high) - risk is known, information is experienced/documented

5.3 Control measures

The control measures are established to prevent, reduce, or eliminate potential hazards.

6 HAZARD ANALYSIS REPORT

6.1 Sub-system: plant material

Abbreviation notes: H = High, M= Medium L= Low

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Chemical Treatments	Chemical	Incorrect rate of seed treatment applied. Seed treatment applications not approved by product labels in country of use.	H	L	M	Many seeds are purchased pretreated from a commercial distributor with a defined calibration process. Carryover risk to end product is variable, depending on the crop.	**FV-GFS Section 26 – Plant Propagation Materials** A quality control system that contains a monitoring system for visible signs of pests and diseases shall be in place and current records of the monitoring system shall be available. The term “nursery” shall refer to any place where propagation materials are produced, including in-house selection of grafting materials. The monitoring system shall include the recording and identification of the mother plant or field of origin crop, as applicable. Recording shall occur at regular, established intervals. If the cultivated trees or plants are intended for own use only (i.e., not sold), in-house records for monitoring and propagation activities shall suffice. Where rootstocks are used, special attention shall be paid to the origin of the rootstocks through documentation. **FV-GFS 26.04,** Records of all plant protection product treatments applied during the plant propagation period for in-house plant nursery propagation shall be available and include: - Location - Date - Trade name, active ingredient, and preharvest interval of each product - Name of applicator

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							- Justification for application - Quantity - Machinery used This principle and the respective criteria apply primarily to short cycle crops, where the treatment of propagation materials affect food safety. It would not apply to most fruit trees, where propagation and active production are separated by longer periods of time. **FV-GFS 26.05** Records with the name(s) of chemical product(s) applied on propagation materials by the supplier shall be available on request. This can be in the form of: - Application records maintained by the supplier - Information on seed packages - List with names of plant protection products applied Producers sourcing from suppliers who have GLOBALG.A.P. certification for plant propagation material, or for an equivalent or GLOBALG.A.P. recognized certification is considered compliant. “N/A” for perennial crops.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Management of substrates for planting in the producer's own nurseries.	Biological	Transmission of soil diseases because mishandling of substrates used in the nursery itself or poor disinfection of the substrate	H	L	M	Not having disinfected substrates can lead to the diffusion of diseases from the substrate to the soil where the seedling will be planted	**FV-GFS 28.03.03** There shall be records that attest to the source of the substrate of natural origin being used. These records shall demonstrate that the substrate does not come from designated conservation areas. Opportunities to decrease the use of peat shall be considered. **FV-GFS 28.01.03** When rotations of annual crops to improve soil structure and minimize soil-borne pests and diseases are carried out, this shall be verifiable from planting dates or crop or field records. Records shall exist for the previous two-year rotation. **FV-GFS 29.03.01** A risk assessment for organic fertilizer shall be documented, conducted prior to use of the organic fertilizer, and it shall consider the following: - Type of organic fertilizer - Method of treatment - Microbial contamination - Weed/Seed content - Heavy metal content - Timing of application - Placement of application (e.g., in contact with edible portion of the crop) Procedures shall take into consideration World Health Organization (WHO) guidance. This also applies to substrates from biogas plants.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							For commercially available organic fertilizers, accompanying documentation and certifications of quality and content may be substituted for a risk assessment.

6.2 Sub-system: land preparation

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Site History and Site Management	Chemical Residue from agrochemical treatments to prior crops grown on land.	Residues agrochemical chemicals from previous land use. Spray drift from adjacent blocks/farms.	H	M	M	Previous land use is known, and spray records from prior seasons are maintained.	**FV-GFS 21.01** A documented risk assessment is completed for all registered sites. The risk assessment shall be: - Available for all production sites, including structures - Reviewed at least annually or when changes occur (new risks emerge or new sites or crops enter production) It shall consider: - Biological, physical, and chemical hazards (including allergens) - Risk of microbial cross contamination originating from neighboring or adjacent sites - Site history (minimum of one year, with five years recommended) - Impact of proposed activities on adjacent crops **FV-GFS 21.02** A management plan that establishes strategies for minimizing the risks identified in the risk assessment for operation suitability has been developed and implemented and is reviewed regularly.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							A management plan shall: - Be reviewed together with the risk assessment (annually or when changes occur) and address all risks identified in the risk assessment - Describe the control measures implemented for the risks identified - Be appropriate to farm operations - Support facility design, cleaning activities, pest control, and other activities to minimize food safety risks - Ensure that the layout and flow of operations are suitable for the intended purpose, consider applicable structures, and are designed to minimize food safety risks - Be effective and visibly implemented
	Chemical Oil, grease, hydraulic fluid, and fuel contamination	Equipment used for land preparation may have leaking hoses, failing hydraulic systems, engine oil loss, or other sources of contamination.	H	L	M	There is a low risk of many crops to be contaminated from leaks from equipment, providing routine maintenance is occurring accompanied by visible inspections during operation.	**FV-GFS 13.01** Equipment, tools, and devices are fit for purpose and maintained. Equipment, tools, and devices coming into contact with products shall be made of materials that are safe for contact with products (nontoxic) and designed and constructed to ensure that they can be cleaned, disinfected, and maintained to avoid contamination. Equipment, tools, and devices, even those not coming into direct contact with products (scales, plant protection product (PPP) or fertilizer application equipment, thermometers, pH meters, etc.), shall be identified, maintained, routinely verified, and, where applicable, calibrated at least annually. Calibration shall be traceable to a national or international standard

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							or method. Equipment maintenance, calibration (where applicable), and repairs shall be documented. Maintenance activities shall not present risks to food safety, the environment, or workers. PPP sprayers: The calibration of PPP application machinery (automatic and nonautomatic) shall have been verified for correct operation within the last 12 months, and this verification shall be certified or documented either by participation in an official scheme (where it exists) or by having been carried out by a person who can demonstrate their competence. Irrigation/Fertigation equipment: At a minimum, annual maintenance records shall be kept for all methods of irrigation/fertigation machinery/techniques used.
	Physical Foreign objects	Glass, metal, wire, garbage, etc. may be present in field	M	M	M	Visual checks and site assessment procedures are in place from the point of the pre-plant site selection through harvesting. Part of the pre-plant inspection includes an assessment of the production area. Employees are training to look for and remove foreign objects during the	**FV-GFS 21.01** A documented risk assessment is completed for all registered sites. The risk assessment shall be: - Available for all production sites, including structures - Reviewed at least annually or when changes occur (new risks emerge or new sites or crops enter production) It shall consider: - Biological, physical, and chemical hazards (including allergens) - Risk of microbial cross contamination originating from neighboring or adjacent sites

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
						production season and harvest.	- Site history (minimum of one year, with five years recommended) - Impact of proposed activities on adjacent crops **FV-GFS 21.02** A management plan that establishes strategies for minimizing the risks identified in the risk assessment for operation suitability has been developed and implemented and is reviewed regularly. A management plan shall: - Be reviewed together with the risk assessment (annually or when changes occur) and address all risks identified in the risk assessment - Describe the control measures implemented for the risks identified - Be appropriate to farm operations - Support facility design, cleaning activities, pest control, and other activities to minimize food safety risks - Ensure that the layout and flow of operations are suitable for the intended purpose, consider applicable structures, and are designed to minimize food safety risks - Be effective and visibly implemented
Site History and Site Management	Biological Presence of pathogenic bacteria in water source due to upstream livestock activity.	Biological contamination of water source from feces of livestock and sewage/effluent.	H	L	H	The risk level would depend on risk analysis of the water source, type of crop grown, and agricultural practices. Fields located near livestock operations may need to be more	**FV-GFS 30.01.03** A water management plan is available. A documented water management plan shall: - Be reviewed at least annually, based on the reviewed risk assessments - Assess the need for maintenance of irrigation and other water delivery equipment - Identify worker training required to support maintenance and repairs

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
						frequently tested for water quality. Alternative water sources or water treatments may be necessary to mitigate the risk.	- Be either an individual or a regional plan if participation in a community irrigation system is documented - Include reference to water analysis - Include corrective actions taken related to water quality **FV-GFS 30.01.04** Actions are taken to complement on-farm water management with off-farm activities (while recognizing that the legal scope of the producer is on the farm). Available evidence should indicate awareness of the producer on (or participation in) projects, joint action, or collaboration on water management with stakeholders in the neighboring catchment area, watershed, landscape, or beyond, for example with other producers, sector- or crop-specific initiatives, nongovernmental organizations, etc.
	Biological Contamination of soil by human pathogens	Biological contamination due to spillage of toilets or leaching of sewage for failed septic systems. Flood events are becoming more common globally, so sewage may be introduced in such instances.	M	L	L	Toilets are provided at locations away from water sources. Water quality is assessed after flood events to determine if there is a risk of human pathogens.	**FV-GFS 30.05.04** Water that comes into contact with products during harvest and postharvest meets the microbial standard for drinking water. Water (including ice) used during harvest and postharvest activities (cooling, transport, washing, etc.) shall meet the microbial standards for drinking water and shall be handled so as to prevent product contamination. The only exception are flood-harvested

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							cranberry fields, where analysis shall confirm that the water is not a source of microbial contamination for the product. **FV-GFS 19.05** Clean toilets are provided for workers, visitors, and subcontractors in the vicinity of their work. Toilets provided for production and handling activities (including stationary or mobile toilets) shall be: - Designed and located so as to minimize the potential risk for product contamination - Constructed of material that is easy to clean and maintain (also applies to pit latrines) - Allow for direct accessibility for servicing - Located in reasonable proximity to the place of work, i.e., accessible on foot or by a readily available mode of transportation If production and/or handling takes place in a facility, the doors of toilets shall not open directly onto the production and/or product handling area, unless the door is self-closing. Toilets shall be appropriately cleaned, maintained, and stocked. Facilities shall also be available to visitors, where applicable.
Soil Fumigation	Chemical Off-gassing of fumigant detected with approved instruments.	Incorrect application methods, which may include incorrect rate, improper water sealing, improper soil incorporation,	H	L	M	Written justification exists for fumigation. Trained fumigation operator supervises the application.	**FV-GFS 28.02.01** There is documented justification for the use of soil fumigants. There shall be documented evidence and justification for the use of soil fumigants, including targeted problem, location, date, active ingredient, doses, method of application, and

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
		or faulty equipment.					operator. Methyl bromide shall never be used as a soil fumigant. **FV-GFS 28.02.02** The preplanting interval is complied with. The preplanting interval shall be recorded.
Application Machinery	Chemical Improper delivery rate of fertilizers and in furrow agrochemicals.	Application machinery used not calibrated.	L	L	L	Fertilizers in many cropping systems are applied prior to planting or early in the production season, before fruit or vegetable set. In-furrow treatments are often leached or degraded before harvest begins.	**FV-GFS 13.01** Equipment, tools, and devices are fit for purpose and maintained. Equipment, tools, and devices coming into contact with products shall be made of materials that are safe for contact with products (nontoxic) and designed and constructed to ensure that they can be cleaned, disinfected, and maintained to avoid contamination. Equipment, tools, and devices, even those not coming into direct contact with products (scales, plant protection product (PPP) or fertilizer application equipment, thermometers, pH meters, etc.), shall be identified, maintained, routinely verified, and, where applicable, calibrated at least annually. Calibration shall be traceable to a national or international standard or method. Equipment maintenance, calibration (where applicable), and repairs shall be documented. Maintenance activities shall not present risks to food safety, the environment, or workers. PPP sprayers: The calibration of PPP application machinery (automatic and nonautomatic) shall

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							have been verified for correct operation within the last 12 months, and this verification shall be certified or documented either by participation in an official scheme (where it exists) or by having been carried out by a person who can demonstrate their competence. Irrigation/Fertigation equipment: At a minimum, annual maintenance records shall be kept for all methods of irrigation/fertigation machinery/techniques used.
Fertilizer Storage	Chemical Contamination of crop protectant chemicals with fertilizers	Lack of segregation in storage area for crop protectant materials and fertilizers. Improper fertilizer storage.	H	L	H	Storage areas checked routinely and inventories taken during inspections. Fertilizers are labeled and staff trained in proper fertilizer storage procedures, according to their job duties.	**FV-GFS 29.02.01** Fertilizers and biostimulants are stored in an appropriate manner that does not compromise food safety. Fertilizers and biostimulants shall be stored in a designated area separate from plant protection products (PPPs) and harvested or packed products. Cross contamination between fertilizers (organic and inorganic), biostimulants, and PPPs shall be prevented. Use of a physical barrier (wall, sheeting, etc.) may be based upon defined risk. Fertilizers and biostimulants that are applied together with PPPs (micronutrients, foliar fertilizers, etc.) can be stored with PPPs if both are kept in closed containers. **FV-GFS 29.02.02** Fertilizers and biostimulants are stored in an appropriate manner that reduces the risk of

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							environmental contamination. Fertilizers (organic and inorganic) and biostimulants shall be stored in a designated area. Appropriate measures shall have been taken to prevent the pollution of water sources (concrete foundations, walls, leak-proof container, etc.), or the fertilizers shall be stored at least 25 meters from water sources. Where necessary, inorganic fertilizers (powders, granules, liquids, etc.) shall be protected from atmospheric influences (sunlight, frost and rain, high temperatures, etc.). Based on a risk assessment (fertilizer type, weather conditions, storage duration and location), plastic coverage may be acceptable. It is permitted to store lime and gypsum in the field. As long as the storage requirements on the safety data sheet (SDS) are complied with, bulk liquid fertilizers can be stored outside in containers. The storage area shall be well ventilated and free from rainwater or heavy condensation. Inorganic fertilizers shall be stored in an area that is free from waste, does not constitute a breeding place for rodents, and where spillage and leakage can be cleared away.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Organic Fertilizer	Biological Contamination by human and animal pathogens	Microbes in fresh manure and untreated organic fertilizer.	H	H	H	Animal manure is either not used or treated via appropriate composting before use.	**FV-GFS 29.03.01** A risk assessment for organic fertilizer is conducted as per intended use. A risk assessment for organic fertilizer shall be documented, conducted prior to use of the organic fertilizer, and it shall consider the following: - Type of organic fertilizer - Method of treatment - Microbial contamination - Weed/Seed content - Heavy metal content - Timing of application - Placement of application (e.g., in contact with edible portion of the crop) Procedures shall take into consideration World Health Organization (WHO) guidance. This also applies to substrates from biogas plants. For commercially available organic fertilizers, accompanying documentation and certifications of quality and content may be substituted for a risk assessment. **FV-GFS 29.03.02** The interval between the application of organic fertilizer and harvest does not compromise food safety. Records shall show that the interval between the use of composted organic fertilizers and harvest does not compromise food safety.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							If raw animal manure is used, it shall be incorporated into the soil. The risks associated with the type of raw manure used and intended use shall be evaluated when establishing a preharvest interval, while adhering to the following minimum requirements: - For tree crops (i.e., trees with the lowest fruit suspended well above the ground, so that the fruit does not come into contact with the soil, and excluding low bushes): Raw manure shall be applied prior to bud burst or on a shorter interval based on the risk assessment, but never shorter than 60 days prior to harvest. - Leafy greens: Raw manure shall never be applied after planting, regardless of any harvest interval. - For other crops: Raw manure shall be applied at least 60 days prior to harvest.

6.3 Sub-system: growing

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Irrigation	Biological Contamination by human and animal pathogens	Biological contamination of water source from feces of livestock and sewage/effluent.	H	M	H	Livestock and sewage are excluded from water source. Water not applied directly onto many crops or close to harvest but high risk if untreated sewage is used. Level would depend on risk analysis of water source, type of crop grown, agricultural practices and end user. Water sources and site risk analysis in place.	**FV-GFS 30.01.03** A water management plan is available. A documented water management plan shall: - Be reviewed at least annually, based on the reviewed risk assessments - Assess the need for maintenance of irrigation and other water delivery equipment - Identify worker training required to support maintenance and repairs - Be either an individual or a regional plan if participation in a community irrigation system is documented - Include reference to water analysis - Include corrective actions taken related to water quality **FV-GFS 30.05.01** Water is analyzed for food safety, in accordance with the risk assessment. Water shall be analyzed for food safety at a frequency consistent with the risk assessment and current sector-specific standards or relevant regulations. Water analysis shall be part of the water management plan and completed at least once per year, or more frequently if required by the risk assessment (e.g., in controlled environment agriculture (CEA) production). A minimum of one analysis per season or certification cycle shall be required on water that comes into contact with products during

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							postharvest processing, with samples taken as near the point of application as possible. A minimum of one analysis shall be required even when using municipal water sources. The water analysis shall reflect the nature and extent of the water system, the scope of production (type of product, applications, harvesting, handling, water sources, etc.). Where different water sources are used, they shall each be sampled. Samples shall be taken from locations that are representative of the water source, usually as close to the point of application as possible. Analysis shall be performed during the time of water use on products and during the period of highest risk. There shall be a documented procedure for water analysis, including: - Frequency of sampling - Person responsible for sampling - Method of sample collection - Laboratory analyzing the samples - Location sampled Records of all analysis shall be maintained.
Application Machinery	Chemical contamination due to inconsistent delivery rate.	Application machinery not properly maintained and calibrated.	L	M	L	Calibration of fertilizer delivery systems occurs at defined intervals, and records are kept.	**FV-GFS 13.01** Equipment, tools, and devices are fit for purpose and maintained. Equipment, tools, and devices coming into contact with products shall be made of materials

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							that are safe for contact with products (nontoxic) and designed and constructed to ensure that they can be cleaned, disinfected, and maintained to avoid contamination. Equipment, tools, and devices, even those not coming into direct contact with products (scales, plant protection product (PPP) or fertilizer application equipment, thermometers, pH meters, etc.), shall be identified, maintained, routinely verified, and, where applicable, calibrated at least annually. Calibration shall be traceable to a national or international standard or method. Equipment maintenance, calibration (where applicable), and repairs shall be documented. Maintenance activities shall not present risks to food safety, the environment, or workers. PPP sprayers: The calibration of PPP application machinery (automatic and nonautomatic) shall have been verified for correct operation within the last 12 months, and this verification shall be certified or documented either by participation in an official scheme (where it exists) or by having been carried out by a person who can demonstrate their competence. Irrigation/Fertigation equipment: At a minimum, annual maintenance records shall be kept for all methods of irrigation/fertigation machinery/techniques used.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Organic Fertilizer	Biological Contamination by human and animal pathogens (root and ground crops)	Microbes in fresh manure and untreated organic fertilizer.	M	H	H	Animal manure fertilizer is either not used or composted before use.	**FV-GFS 29.03.01** A risk assessment for organic fertilizer is conducted as per intended use. A risk assessment for organic fertilizer shall be documented, conducted prior to use of the organic fertilizer, and it shall consider the following: - Type of organic fertilizer - Method of treatment - Microbial contamination - Weed/Seed content - Heavy metal content - Timing of application - Placement of application (e.g., in contact with edible portion of the crop) Procedures shall take into consideration World Health Organization (WHO) guidance. This also applies to substrates from biogas plants. For commercially available organic fertilizers, accompanying documentation and certifications of quality and content may be substituted for a risk assessment. **FV-GFS 29.03.02** The interval between the application of organic fertilizer and harvest does not compromise food safety. Records shall show that the interval between the use of composted organic fertilizers and harvest

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							does not compromise food safety. If raw animal manure is used, it shall be incorporated into the soil. The risks associated with the type of raw manure used and intended use shall be evaluated when establishing a preharvest interval, while adhering to the following minimum requirements: - For tree crops (i.e., trees with the lowest fruit suspended well above the ground, so that the fruit does not come into contact with the soil, and excluding low bushes): Raw manure shall be applied prior to bud burst or on a shorter interval based on the risk assessment, but never shorter than 60 days prior to harvest. - Leafy greens: Raw manure shall never be applied after planting, regardless of any harvest interval. - For other crops: Raw manure shall be applied at least 60 days prior to harvest.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Crop protection Choice of Plant Protection Products (PPP) (herbicide, insecticides and fungicides)	Chemical Residue in excess of MRL for country of destination	Unregistered chemical used for target crop. Pre-harvest interval not observed. Personnel not properly trained for application procedures.	H	L	H	Competent person makes the selection of plant protection products. Pre-harvest interval observed and referenced with product label Laboratory testing for MRL is part of the food safety plan, and recorded results kept on file.	**FV-GFS 32.07.01** Information regarding maximum residue levels (MRLs) is available for the destination markets in which products will be traded. The producer or the producer's customer shall have a list of currently applicable MRLs for all markets in which products are intended to be traded (domestic and/or international). The MRLs shall be identified by either demonstrating communication with clients confirming the intended markets or by selecting the specific country or countries in which products are intended to be traded. **FV-GFS 32.07.02** A risk assessment for all registered products has been completed and the maximum residue level (MRL) requirements of the applicable market(s) are met. The risk assessment shall cover all registered crops and the potential risk of MRL exceedance based on plant protection product (PPP) usage. Residues of agricultural chemicals shall not exceed levels established by applicable and prevailing legislation (in both countries of production and intended sale), or by the Codex Alimentarius Commission. Risk assessment may conclude that analyses are not required when all of the following conditions are met:

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							- No use of PPPs during the production season or during postharvest handling - Evidence of residue testing by the customer (processor or other) - A risk assessment validated by an independent third party (e.g., certification body (CB) auditor) or the customer Where the risk assessment concludes an analysis is required, the number, type, location, and frequency of sampling shall be recorded. Complying with MRL thresholds in the country of production is required, regardless of whether the product is exported to other countries. If MRLs of the market of intended export are stricter than those of the country of production, documentation exists that these MRLs have been addressed. Documentation shall support export decisions based upon PPP use and MRL analysis results to maintain compliance with country-of-destination regulations. Where brokers are responsible for all shipments and the country-of-destination is outside of the producer's control, compliance with the MRLs in the country of production shall be verified. The producer may delegate the risk assessment and sampling to a third party managed PPP residue monitoring system (RMS) that is assessed by a GLOBALG.A.P. approved CB.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							FV-GFS 32.07.03 The correct maximum residue level (MRL) sampling and testing procedures are followed. Documented evidence shall be available demonstrating compliance with applicable sampling procedures. **FV-GFS 32.07.04** A documented action plan is available that describes the steps to be taken if an unauthorized plant protection product (PPP) is detected in the maximum residue level (MRL) sampling. A documented action plan shall be available that describes the steps to be taken in the event that the MRL analysis detects the presence of a PPP that is not authorized for use on the product (not registered in the country of production, not labeled for use on the product, etc.). The plan shall detail the steps taken to investigate the cause, to ensure all food safety risks are mitigated, and to arrange for disposal of the product, if needed. **FV-GFS 32.07.05** A documented action plan is available that describes the steps to be taken if a maximum residue level (MRL) is exceeded. A documented action plan shall be available that describes the steps and actions to be taken in

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							the event that a plant protection product residue analysis indicates a MRL has been exceeded (MRL of both country of production and countries of destination, if different). The action plan shall include communication to customers and may be part of the recall and withdrawal procedure.
Application Equipment	Chemical Residue in excess of MRL	Incorrect application – due to incorrect rate during mixing,	M	L	M		**FV-GFS 03.02** Individuals responsible for technical decision-making on inputs can demonstrate competence. Individuals responsible for technical decisions regarding treatments (quantity and type of fertilizer, pre- and postharvest plant protection product (PPP) applications, both organic and inorganic, etc.) shall demonstrate competence in such topics. If the individual responsible for technical decisions is the producer, a designated worker, or a technical expert, their experience shall be complemented by current technical knowledge (access to technical literature, specific training attendance, active PPP applicator license, etc.). If the individual responsible for technical decisions is an external qualified adviser, technical competence shall be demonstrated by official qualifications or specific training attendance certificates.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Disposal of Surplus Agrochemical Application Mix	Chemical Residue in excess of MRL	MRLs exceeded due to spray drift from neighboring field.	H	L	M	Human health impacts due to MRL exceedance potential.	**FV-GFS 32.01.04** The producer takes active measures to prevent plant protection product (PPP) drift from neighboring plots. The producer should take active measures to avoid the risk of PPP drift from adjacent plots e.g., by making agreements and organizing communication with producers from neighboring plots in order to eliminate the risk of undesired PPP drift, by planting vegetative buffers at the edges of cropped fields, and by increasing PPP sampling on such fields.
Empty Plant Protection Product Containers	Chemical Container waste present on farm	Use of empty plant protection product for unapproved use or storage of other materials.	L	H	M	Containers stored in safe location away from produce and not re-used.	**FV-GFS 32.04.01** Empty plant protection product (PPP) containers are triple rinsed with water before storage and disposal, and the rinsate is disposed of in such a way as to mitigate the risk to the environment. Pressure-rinsing equipment for PPP containers shall be installed on the PPP application machinery, or there shall be documented instructions to rinse each container at least three times prior to its disposal. Either via the use of a container-handling device or according to a documented procedure for the application equipment operators, the rinsate from the empty PPP containers shall always be put back into the application equipment tank when mixing or disposed of in a manner that compromises neither food safety nor the environment.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							FV-GFS 32.04.03 Empty containers are kept secure until disposal is possible. There shall be a designated secure storage point for all empty plant protection product (PPP) containers prior to disposal that is isolated from the crop and packaging materials (e.g., permanently marked via signage) with physically restricted access for persons and fauna. **FV-GFS 32.04.04** Empty plant protection product (PPP) containers are disposed of in such a way as to mitigate the risk to humans and the environment. The producer shall dispose of empty PPP containers using a safe handling system prior to the disposal, and a disposal method that avoids exposing people to the contents and avoids contamination of the environment (watercourses, flora, and fauna).
Expired plant protection products	Chemical	Use of obsolete plant protection product on crop.	H	L	M	Containers stored in safe location away from produce and not re-used. Inventory identifies expired materials until appropriate disposal or recycle arrangements are made.	**FV-GFS 32.05.01** Obsolete plant protection products (PPPs) are securely maintained, identified, and disposed of via authorized or approved channels. There shall be records indicating that obsolete PPPs have been disposed of via officially authorized channels. If this is not possible, obsolete PPPs shall be securely maintained and identifiable.

6.4 Sub-system: harvesting

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Harvest equipment	Allergen residue present on harvest equipment	Equipment in contact with allergen-containing materials	H	L	H	If an allergen cross-contamination event were to occur and it was not properly addressed, very sensitive members of population could get extremely ill or even die.	**FV-GFS 21.06** Where the operation handles or stores allergens, the operation has a documented allergen management program. The allergen management program shall list the allergens in use, stored, or handled by workers at the site specific to prevailing regulations. Where applicable, procedures shall address identification and segregation of allergens during storage, handling, loading, and shipping as based on a risk assessment conducted by the operation. All products intentionally or potentially containing allergenic materials shall be labeled according to the allergen labeling regulations in the country of production and the country of destination.
Harvest handling containers	Biological Contamination	Contamination of harvest containers animal droppings.	H	M	H	The presence of animal feces on any food contact surface, including harvesting containers, poses a significant food safety risk. The methods if inspection, washing, and appropriate use of containers all mitigate the risk. In the industry, containers are often stored outside, so	**FV-GFS 19.08** Containers used for production and harvesting are cleaned, maintained, and appropriate for use. Production and harvesting containers shall be made of nontoxic materials that do not pose a risk to food safety and be constructed to facilitate cleaning and maintenance. Reusable containers shall be clean before use. A documented cleaning schedule that includes frequency and is in accordance with the hygiene risk assessment shall be in place. Disinfection shall be incorporated into the cleaning procedure

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
						this is a common scenario for consideration.	when required in the hygiene risk assessment. Harvest containers shall be used exclusively for product (not used to store chemicals, lubricants, oil, trash, tools, etc.).
Harvest crew training	Biological	Lack of specific hygiene training results in workers intermittently not washing hands after blowing their nose or using the toilet.	H	M	H	Hygiene training is conducted and records of training kept. Workers must be trained in appropriate hygiene procedures, in accordance to the risk assessment. Training must occur at intervals sufficient to support good and consistent compliance.	**FV-GFS 19.01** The farm has a documented hygiene risk assessment. A documented hygiene risk assessment covering production, harvesting, and handling, as applicable, shall cover: - Physical, chemical, and microbiological contaminants, spillage of bodily fluids (vomiting, bleeding, etc.), and human transmissible diseases that are associated with the applicable products and processes - Workers, personal effects, equipment, clothing, packaging material, transport, vehicles, and product storage (including short-term storage on the farm) - The production environment, including design and layout for prevention of cross contamination and support of food safety - Measurement and monitoring of cleaning and hygiene activities **FV-GFS 19.02** Documented hygiene procedures are in place to minimize food safety risks. Hygiene procedures shall be aligned with the risk assessment and include applicable harvest and postharvest activities. Pictograms or signs in

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							the predominant workforce language shall describe the appropriate hygiene measures for workers, visitors, and subcontractors. When protective equipment and clothing (smocks, aprons, sleeves, gloves, footwear, etc.) are required, they shall be provided by the employer and cleaned, maintained, and stored in a way that minimizes food safety risks. Hands shall be washed whenever they may be a source of contamination, including prior to the start of work and after using the toilet. The hygiene procedures shall address contamination of product with bodily fluids, reporting requirements for sick people (vomiting, jaundice, diarrhea, etc.), restricting ill persons' contact with products, and a return-to-work policy. Skin cuts shall be covered and gloves used, as appropriate. Visual evidence shall show that no violations of the hygiene procedures occur. **FV-GFS 19.03** All persons working on the farm have received hygiene training. Basic training on hygiene shall: - Be provided annually to all workers, including owners and managers that are working on the farm - Be provided to all new workers

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							- Cover all necessary instructions - Be given in a format, either written or verbal, that ensures understanding (may be in verbal and pictorial form without written explanatory content, where appropriate) - Specifically include training on hygiene procedures for harvesting and product handling activities, where applicable
Packaging/ Harvesting Containers on Farm	Physical Foreign objects	Empty water bottles found in harvesting containers	M	L	L	Workers shall be trained on the proper use of harvesting containers, where to place their drinking bottles, and where to dispose of litter and waste.	**FV-GFS 19.08** Containers used for production and harvesting are cleaned, maintained, and appropriate for use. Production and harvesting containers shall be made of nontoxic materials that do not pose a risk to food safety and be constructed to facilitate cleaning and maintenance. Reusable containers shall be clean before use. A documented cleaning schedule that includes frequency and is in accordance with the hygiene risk assessment shall be in place. Disinfection shall be incorporated into the cleaning procedure when required in the hygiene risk assessment. Harvest containers shall be used exclusively for product (not used to store chemicals, lubricants, oil, trash, tools, etc.).

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Handling and hydrocooling in field	Biological Contamination from human and animal pathogens	Ice used at point of harvest is not potable	H	L	H	Ice not always used. Ice most of the time handled in a hygienic way and made from water source with an analysis and known water quality.	**FV-GFS 30.05.04** Water that comes into contact with products during harvest and postharvest meets the microbial standard for drinking water. Water (including ice) used during harvest and postharvest activities (cooling, transport, washing, etc.) shall meet the microbial standards for drinking water and shall be handled so as to prevent product contamination. The only exception are flood-harvested cranberry fields, where analysis shall confirm that the water is not a source of microbial contamination for the product.

6.5 Sub-system: produce handling

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Post-harvest washing	Biological Contamination from human pathogens in recirculated water	Recirculated water becomes contaminated with pathogens and lacks appropriate analysis, effective treatments, and change intervals for the product	H	L	H	By adhering to appropriate management of water quality in recirculated water systems, risks can be mitigated. Some produce may imbibe water or otherwise become contaminated in handling processes with recirculated water. Effective water treatments can mitigate the risk of pathogen transfer in recirculated water handling systems.	**FV-GFS 30.05.05** Recirculated water used during production, harvest, and postharvest is changed or replenished at an appropriate frequency. If water used during production, harvest, and postharvest activities is recirculated, an appropriate frequency for changing the water shall have been established based on applicable parameters (pH, efficacy of antimicrobial water additives, turbidity, visual evaluation, etc.). "N/A" if recirculated water is not used. **FV-GFS 30.05.06** Treated water used during harvest or postharvest is monitored appropriately. Treated water (antimicrobial water additives, ozone, etc.) used during harvest and postharvest activities (e.g., cooling) shall adhere to a documented monitoring system for the treatment process and routine verification of acceptable parameters. Monitoring shall be executed at a frequency established according to a risk assessment. The values measured during monitoring shall be compared to the established allowable parameters. Corrective actions shall be taken for analysis results outside of the allowable thresholds.

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Packing and other applications of compressed air, compressed gas, and steam	Biological Contamination or chemical contamination (oil, etc.)	Contamination of air by proximity to contaminated areas or improperly maintained equipment (e.g., machinery discharges oil into air or steam line)	H	L	M	Fresh fruit and vegetables are only rarely packed in air-tight bags, as some air exchange with the environment is required for ethylene gas to escape. If managed properly, steam should present a low contamination risk, as long as the water has reached a temperature adequate for rendering microorganisms unviable.	**FV-GFS 33.07.01** Air and compressed gases are monitored, stored, and handled so as to minimize food safety risks. Air and compressed gases used in product handling (e.g., for drying) and which could affect food safety shall be regularly monitored, appropriately stored, and handled so as to minimize the risk of product contamination. Based on a risk assessment, the degree of monitoring appropriate for compressed air that comes into contact with the product shall be defined. Risk mitigation activities may include monitoring of filters and do not necessarily require laboratory analysis of air samples.
Storage areas	Biological Bird droppings in storage area for packaging	Contamination of packaging, with bird droppings	H	L	M	Screens used to prevent bird intrusion.	**FV-GFS 33.01.01** Harvested and packed products are stored to minimize food safety risks. All harvested products (packed products, bulk) are stored appropriately and protected from contamination in accordance with the hygiene risk assessment. **FV-GFS 33.01.03** Packaging materials are appropriate for their intended use and stored under conditions that protect the materials from contamination. Packaging materials (including reusable crates) shall be appropriate for their intended use and

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							stored under conditions that protect the materials from contamination and deterioration. Packaging materials may be stored outside, providing risks of contamination have been addressed (e.g., packaging materials sealed in plastic covers).
Packing and storage area	Chemical Residues (including allergens)	Incorrect cleaning procedures. Incorrect storage of cleaning chemicals Cross-contact with allergen-containing materials	M	L	L	Use of food grade chemicals and/or registered for use of cleaning of food contact areas. Appropriate segregation where relevant.	**FV-GFS 33.01.04** Cleaning equipment, agents, lubricants, etc. are stored and used to prevent chemical contamination of products and are approved for application in the food industry. To avoid chemical contamination of products, cleaning equipment, agents, lubricants, etc. shall be kept in a designated secure area, away from products. Documented evidence (specific label mention or technical data sheet) shall exist authorizing use for the food industry of all cleaning agents, lubricants, etc. that may come into contact with products. Chemicals shall be applied according to the product label instructions. **FV-GFS 21.06** Where the operation handles or stores allergens, the operation has a documented allergen management program. The allergen management program shall list the allergens in use, stored, or handled by workers at the site specific to prevailing regulations. Where applicable, procedures shall address identification and segregation of allergens during storage, handling, loading, and shipping as

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
							based on a risk assessment conducted by the operation. All products intentionally or potentially containing allergenic materials shall be labeled according to the allergen labeling regulations in the country of production and the country of destination.
	Physical Foreign objects	Nails present on packing line from damaged pallets.	M	L	L	Pallets checked before use and repaired or rejected. Packaging container protects most produce.	**FV-GFS 19.08** Containers used for production and harvesting are cleaned, maintained, and appropriate for use. Production and harvesting containers shall be made of nontoxic materials that do not pose a risk to food safety and be constructed to facilitate cleaning and maintenance. Reusable containers shall be clean before use. A documented cleaning schedule that includes frequency and is in accordance with the hygiene risk assessment shall be in place. Disinfection shall be incorporated into the cleaning procedure when required in the hygiene risk assessment. Harvest containers shall be used exclusively for product (not used to store chemicals, lubricants, oil, trash, tools, etc.).

6.6 Sub-system: waste and pollution management, recycling and re-use

Process	Potential Hazard	Cause	Severity	Likelihood	Significance	Reason for Significance rating	Control Measures
Identification of waste and pollutants	Biological Contamination	Insufficient waste management and removal Excessive waste is breeding place for vermin and pathogens	M	M	M	Identification and frequent removal of waste	**FV-GFS 25.01** A waste management system is implemented. A waste management system addressing potential contamination of product or the environment (air, soil, substrate, and water) shall: - Be documented and current - Address collection, storage, and disposal of waste material, including plant protection products, fertilizers, wastewater, drainage, and packaging material, where applicable - Addresses potential for contamination of nearby water sources, roadways, and adjacent land **FV-GFS 25.02** Waste products and sources of pollution are identified in all areas of the farm. Possible waste products (paper, cardboard, plastic, oil, etc.) and sources of pollution (fertilizer excess, exhaust smoke, oil, fuel, noise, effluent, chemicals, etc.) associated with farm processes shall be identified. In Option 2 producer groups, evidence at quality management system (QMS) level is acceptable.

7 HACCP TABLE

After having completed the comprehensive hazard analysis, a HACCP table is compiled for all the critical control points identified. These are the points from the hazard analysis results that were rated as having a high significance and have verifiable control measures to mitigate the risk.

The HACCP table document processes that are critical control points (CCPs), the following information:

1) Potential hazards
2) Control measures
3) Critical limits and monitoring procedures for control measures
4) Records

A critical control point is a process where a food safety hazard of high significance can occur and control of the hazard is necessary for food safety.

Critical Control Point	Potential Hazard	Control Measure	Critical Limit	Monitoring Procedure	Corrective Action	Records
Site History	Biological Presence of human pathogens in water source	Risk analysis is performed, covering soil, water, prior use	No critical risk to food safety, operator health and environment.	This is done for each new site. Records are kept. Corrective action is set out for potential negative impact.	Site is not used when a non-controllable risk that is critical to health and/or environment is identified.	Soil analysis Water analysis Water use rights
Fertilizer Storage	Chemical Contamination of fresh produce	Chemicals are stored separate from fresh produce and plant propagation material.	Chemical store is dedicated to storage of chemicals.	Inventory of chemicals needed for crops in rotation is available – checked regularly.	Review storage areas. Retrain personnel involved with pesticides on regulations.	Inventory Policy
Organic Fertilizer	Biological Contamination by human pathogens (root and ground crops)	Human sewage sludge is not used on the farm	Under no circumstances are human sewage sludge used on the farm	Microbial analysis of organic fertilizer.	Organic fertilizer is not used if it is of human origin	Microbial analysis
Irrigation	Biological Contamination by human pathogens	Untreated human sewage water is not used on the farm for irrigation	Treated human sewage water complies with regulations.	Microbial analysis of irrigation water.	Human sewage water must be treated before use.	Microbial analysis before and after treatments.

Critical Control Point	Potential Hazard	Control Measure	Critical Limit	Monitoring Procedure	Corrective Action	Records
Pesticide Spraying	Chemical Residue in excess of MRL	Observing the pre-harvest interval as per product label instructions	The prescribed pre-harvest interval as per product label instructions	Observing the pre-harvest interval as per product label instructions and as per PPP application record entries	Delay harvesting until pre-harvest interval is observed.	PPP application record entries
		Person responsible for chemical application (owner) and spray operator is trained in chemical use.	Only trained person applies pesticides.	Each year the responsible person checks that his/her farm chemical user training certificate is current and spray operator is trained.	Responsible person and/or sprayer attend refresher course. Retrain spray operator.	Training course certificate. Farm operation records.
		Chemical used are approved and applied according to directions.	Only approved chemicals are used and always applied according to directions.	At the start of each season, owner checks that pesticides are approved and mixing procedures are correct.	Pesticide not used if approval withdrawn. If mixing incorrect, retrain spray operator.	Current list of chemicals approved.
		Chemicals applied according to directions.	Chemicals always applied according to directions.	At the start of each season, owner checks that mixing procedures are correct.	If mixing incorrect, retrain spray operator.	Label instructions for each chemical used. Equipment calibration record.
		Equipment is calibrated regularly/annually.	Equipment calibrated at least annually.	Owner annually checks calibration record.	Calibrate equipment.	Equipment calibration record.
Harvesting - Hygiene	Biological Contamination from human pathogens	Hygiene risk analysis	Observe Hygiene Rules Hand washing procedures	Supervisor checks Containers visual inspection	Retraining in terms of general hygiene protocol when working with fresh produce	Training certificates Self assessment may include the results of a visual observations of worker activities.

Critical Control Point	Potential Hazard	Control Measure	Critical Limit	Monitoring Procedure	Corrective Action	Records
Produce Handling hygiene	Biological Contamination from human pathogens	Hygiene risk analysis	Observe Hygiene Rules in accordance with risk assessment Smoking, eating and chewing - only in dedicated areas	Responsible person checks Induction training	Retraining if necessary Disciplinary action	Training certificates Attendance records of training Self assessment may include the results of a visual observations of worker activities.
Post-harvest Washing	Microbial Contamination from human pathogens	Wash water treated.	Microbial limits adhered to for water used for washing (via suggested levels for authorized treatment product and pH) Defined by prevailing regulation and product label.	Responsible person checks chlorine level and pH of wash water for each treatment run.	Adjust product concentrations as per label (addition of authorized treatment product / adjustment of pH) Delivery equipment adjusted or repaired.	Treatment records.
Post-harvest chemical treatment	Chemical Residue in excess of MRL	Person responsible for chemical application is trained in chemical application and mixing.	Treatment application as per prescribed product instruction label Only a trained person applies chemicals.	Observe prescribed product instruction label Each year, the responsible person checks that the chemical applicator training certificate is current.	Adjust product concentrations as per instruction label The responsible person and/or the applicator attend refresher course.	Training course certificate.
Post-harvest chemical treatment	Chemical Residue in excess of MRL	Chemicals used are approved under prevailing regulations.	Only approved chemicals are used in accordance to prevailing regulations.	At the start of each season, the responsible person checks that chemicals are approved.	Chemical not used if approval withdrawn.	Post-harvest chemical records.

Critical Control Point	Potential Hazard	Control Measure	Critical Limit	Monitoring Procedure	Corrective Action	Records
		Chemicals applied according to label instructions.	Chemicals always applied according to label instructions.	At the start of each season, the responsible person checks that mixing procedures and instructions are correct.	If mixing procedures or instructions are incorrect, retrain spray operator. Mixing procedure are amended if chemical labels change.	Label instructions for each chemical used. Training records.
		Operation of equipment is checked regularly.	Equipment always operates effectively.	Responsible person verifies operation of equipment for each treatment run.	Equipment adjusted or repaired.	Maintenance schedule and repair records.

8 VERIFICATION SCHEDULE

Activity	Description	Frequency	Responsibility	Records
Internal audit/Self assessment	Verify that activities comply with documented requirements.	Once/year or more	As assigned to responsible person	Audit report
	Identify areas of poor performance and opportunities for improvement.			
Site inspection program	Self-assessment including a program of site inspections to ensure site and equipment are routinely maintained	Once/year or more	As assigned to responsible person	Self-assessment (could be combined with internal audit)
Review hazards and risks	Review risk management systems and HACCP plan	Once/year or after any relevant changes occur	As assigned to responsible person	Hazards analysis report
Validate critical limits	Check that critical limits are appropriate.	Once/year or more	As assigned to responsible person	"HACCP" table
Review monitoring and corrective action records	All records to be checked to ensure system is followed and limits adhered to.	Per activity	As assigned to responsible person	Records
Water testing	Water testing for microbial and chemical quality as required	Once/year/per identified risk	As assigned to responsible person	Water analysis results
Chemical residue testing	Product testing for chemical residues	Once/year As per testing schedule	As assigned to responsible person	Water analysis results
Test of traceability and recall/withdrawal systems	Test of traceability and recall/withdrawal systems	Once/year or more	As assigned to responsible person	Results and records of traceability/recall/withdrawal exercise.

9 SUPPORT PROGRAMS

9.1 Traceability

FV-GFS 06.01 All registered products are traceable back to and from the registered farm where they were produced and handled (where applicable). A documented identification and traceability system shall allow registered products to be traced back to the registered farm or supplier, or to the registered farms or suppliers of the Option 2 producer group, and traced forward to the immediate customer (one step forward and one step back).

Harvest information shall link a batch or lot to the production records or the farms of specific producers. Product handling shall also be covered, where applicable.

Records shall be available of the annual verification of the traceability system. This verification can occur through an actual recall and withdrawal or as part of a mock recall and withdrawal exercise.

9.2 Training

FV-GFS 03.03 Worker training includes the necessary skills and competencies and is supported by records. Workers shall be able to demonstrate competence in their assigned tasks.

Tasks that shall require specific training include handling and/or administering of agricultural chemicals, disinfectants, plant protection products (PPPs), biocides, and/or other hazardous substances and operating of equipment.

Evidence of training includes attendance records, certificates, or other relevant qualifications.

Subcontractors shall either be trained by the producer or be able to demonstrate competence through previous training or certification.

FV-GFS 03.04 Records of all training activities are kept. Induction or refresher training shall be recorded.

Training records relevant to the implementation of the standard and good agricultural practices shall include:

- Date of training and duration
- Topic(s) covered
- Names of trainer(s) or training provider(s)
- Names of trainee(s) (e.g., attendance list(s))
- Evidence of attendance (e.g., trainee signature)

9.3 Site and premises

FV-GFS 21.01 A documented risk assessment is completed for all registered sites. The risk assessment shall be:

- Available for all production sites, including structures
- Reviewed at least annually or when changes occur (new risks emerge or new sites or crops enter production)

It shall consider:

- Biological, physical, and chemical hazards (including allergens)

- Risk of microbial cross contamination originating from neighboring or adjacent sites
- Site history (minimum of one year, with five years recommended)
- Impact of proposed activities on adjacent crops

9.4 Equipment and materials

FV-GFS 13.01 Equipment, tools, and devices are fit for purpose and maintained. Equipment, tools, and devices coming into contact with products shall be made of materials that are safe for contact with products (nontoxic) and designed and constructed to ensure that they can be cleaned, disinfected, and maintained to avoid contamination

Equipment, tools, and devices, even those not coming into direct contact with products (scales, plant protection product (PPP) or fertilizer application equipment, thermometers, pH meters, etc.), shall be identified, maintained, routinely verified, and, where applicable, calibrated at least annually. Calibration shall be traceable to a national or international standard or method.

Equipment maintenance, calibration (where applicable), and repairs shall be documented. Maintenance activities shall not present risks to food safety, the environment, or workers.

PPP sprayers: The calibration of PPP application machinery (automatic and nonautomatic) shall have been verified for correct operation within the last 12 months, and this verification shall be certified or documented either by participation in an official scheme (where it exists) or by having been carried out by a person who can demonstrate their competence.

Irrigation/Fertigation equipment: At a minimum, annual maintenance records shall be kept for all methods of irrigation/fertigation machinery/techniques used.

9.5 Cleaning

FV-GFS 19.01 The farm has a documented hygiene risk assessment. A documented hygiene risk assessment covering production, harvesting, and handling, as applicable, shall cover:

- Physical, chemical, and microbiological contaminants, spillage of bodily fluids (vomiting, bleeding, etc.), and human transmissible diseases that are associated with the applicable products and processes
- Workers, personal effects, equipment, clothing, packaging material, transport, vehicles, and product storage (including short-term storage on the farm)
- The production environment, including design and layout for prevention of cross contamination and support of food safety
- Measurement and monitoring of cleaning and hygiene activities

9.6 Pest control

FV-GFS 33.04.01 A pest management plan is in place and implemented. A pest management plan for monitoring and control of pests in the packing and storage areas shall be in place.

There shall be visual evidence that the pest monitoring and correcting processes are effective.

9.7 Calibration

FV-GFS 13.01 Equipment, tools, and devices are fit for purpose and maintained. Equipment, tools, and devices coming into contact with products shall be made of materials that are safe for contact with products (nontoxic) and designed and constructed to ensure that they can be cleaned, disinfected, and maintained to avoid contamination.

Equipment, tools, and devices, even those not coming into direct contact with products (scales, plant protection product (PPP) or fertilizer application equipment, thermometers, pH meters, etc.),

shall be identified, maintained, routinely verified, and, where applicable, calibrated at least annually. Calibration shall be traceable to a national or international standard or method.

Equipment maintenance, calibration (where applicable), and repairs shall be documented. Maintenance activities shall not present risks to food safety, the environment, or workers.

PPP sprayers: The calibration of PPP application machinery (automatic and nonautomatic) shall have been verified for correct operation within the last 12 months, and this verification shall be certified or documented either by participation in an official scheme (where it exists) or by having been carried out by a person who can demonstrate their competence.

Irrigation/Fertigation equipment: At a minimum, annual maintenance records shall be kept for all methods of irrigation/fertigation machinery/techniques used.

9.8 Personal hygiene

FV-GFS 19.01 The farm has a documented hygiene risk assessment. A documented hygiene risk assessment covering production, harvesting, and handling, as applicable, shall cover:

- Physical, chemical, and microbiological contaminants, spillage of bodily fluids (vomiting, bleeding, etc.), and human transmissible diseases that are associated with the applicable products and processes
- Workers, personal effects, equipment, clothing, packaging material, transport, vehicles, and product storage (including short-term storage on the farm)
- The production environment, including design and layout for prevention of cross contamination and support of food safety
- Measurement and monitoring of cleaning and hygiene activities

9.9 Storage and transport

FV-GFS 13.03 Vehicles and equipment used for loading, transport, or storage of harvested products are cleaned, maintained, and appropriate for use. Vehicles and equipment used for loading, transport, or storage of harvested products shall be cleaned and maintained and stored to prevent product contamination (animal manure, fuel spills, etc.).

Vehicles and equipment shall be suitable for the intended purpose and stored to minimize food safety risk.

FV-GFS 19.01 The farm has a documented hygiene risk assessment. A documented hygiene risk assessment covering production, harvesting, and handling, as applicable, shall cover:

- Physical, chemical, and microbiological contaminants, spillage of bodily fluids (vomiting, bleeding, etc.), and human transmissible diseases that are associated with the applicable products and processes
- Workers, personal effects, equipment, clothing, packaging material, transport, vehicles, and product storage (including short-term storage on the farm)
- The production environment, including design and layout for prevention of cross contamination and support of food safety
- Measurement and monitoring of cleaning and hygiene activities

Hygiene procedures shall be aligned with the risk assessment and include applicable harvest and postharvest activities. Pictograms or signs in the predominant workforce language shall describe the appropriate hygiene measures for workers, visitors, and subcontractors.

When protective equipment and clothing (smocks, aprons, sleeves, gloves, footwear, etc.) are required, they shall be provided by the employer and cleaned, maintained, and stored in a way that minimizes food safety risks.

Hands shall be washed whenever they may be a source of contamination, including prior to the start of work and after using the toilet.

The hygiene procedures shall address contamination of product with bodily fluids, reporting requirements for sick people (vomiting, jaundice, diarrhea, etc.), restricting ill persons' contact with products, and a return-to-work policy. Skin cuts shall be covered and gloves used, as appropriate.

Visual evidence shall show that no violations of the hygiene procedures occur.

FV-GFS 33.01.01 Harvested and packed products are stored to minimize food safety risks. All harvested products (packed products, bulk) are stored appropriately and protected from contamination in accordance with the hygiene risk assessment.

FV-GFS 33.01.02 All locations for collection, storage, and distribution of packed products are cleaned and maintained. All product handling and storage facilities and equipment (walls, floors, conveyance lines, machinery, etc.) shall be cleaned and maintained with a defined frequency according to a documented cleaning and maintenance schedule. Maintenance shall not introduce food safety risks. Records of cleaning and maintenance shall be kept.

9.10 Parallel ownership, traceability, and segregation

FV-GFS 07.01 An effective system is in place to identify all products originating from GLOBALG.A.P. certified processes and segregate them from products originating from noncertified processes. It shall be possible to identify all products originating from GLOBALG.A.P. certified production processes and to keep them separate from products originating from noncertified production processes.

9.11 Food defense

FV-GFS 15.01 A food defense system is in place to address risks associated with malicious attack or contamination. The system shall include:

- A risk assessment to identify potential threats to the safety of products, taking into account risks from deliberate attempts to inflict contamination or damage
- A documented food defense plan to specify the measures to control any risks identified in the risk assessment
- Consideration of identification of tampering to the premises and products, monitoring of external storage and intake points, controlled access where relevant, receiving inputs from safe sources, and having available information for all employees and subcontractors
- Worker, visitor, and subcontractor awareness of the need to support food defense measures, ensured through training, signs, pictograms, etc.

9.12 Food fraud

FV-GFS 16.01 A system is in place to address risks associated with food fraud. The system shall include:

- A risk assessment to identify potential threats to the safety of the product, taking into account risks from fraudulent or adulterated materials
- A documented food fraud plan to specify the measures to control any risks identified in the risk assessment
- Consideration shall be given to potential impacts of intentional inaccurate information associated with a product for economical gain
- Where applicable, risks associated with counterfeit PPP, unauthorized propagation material, origin of packaging, use of approved suppliers, control over access to packaging shall be considered

10 DEFINITIONS

1) CONTROL:

a) To manage the conditions of an operation to maintain compliance with established criteria.

b) The state where correct procedures are being followed and criteria are being met.

2) CONTROL MEASURE:

Any action or activity that can be used to prevent, eliminate or reduce a significant hazard.

3) CONTROL POINT:

Any step at which biological, chemical (including allergens), physical and radiological factors can be controlled.

4) CORRECTIVE ACTION:

Procedures followed when a deviation occurs.

5) CRITERION:

A requirement on which a judgment or decision can be based.

6) CRITICAL CONTROL POINT:

A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

7) CRITICAL LIMIT:

A maximum and/or minimum value to which a biological, chemical or physical parameter must be controlled at a CCP to prevent, eliminate or reduce to an acceptable level the occurrence of a food safety hazard.

8) DEVIATION:

Failure to meet a critical limit.

9) HACCP: (HAZARD ANALYSIS CRITICAL CONTROL POINTS)

A systematic approach to the identification, evaluation, and control of food safety hazards.

10) HACCP PLAN:

The written document which is based upon the principles of HACCP and which delineates the procedures to be followed.

11) HACCP SYSTEM:

The result of the implementation of the HACCP Plan.

12) HACCP TEAM:

The group of people who are responsible for developing, implementing and maintaining the HACCP system.

13) HAZARD:

A biological, chemical, or physical agent that is reasonably likely to cause illness or injury in the absence of its control.

14) HAZARD ANALYSIS:

The process of collecting and evaluating information on hazards associated with the food under consideration to decide which are significant and must be addressed in the HACCP plan.

15) MONITOR:

To conduct a planned sequence of observations or measurements to assess whether a CCP is under control and to produce an accurate record for future use in verification.

16) RISK:

A function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food.

17) SEVERITY:

The seriousness of the effect(s) of a hazard.

18) VERIFICATION:

Those activities, other than monitoring, that determine the validity of the HACCP plan and that the system is operating according to the plan.

VERSION/EDITION UPDATE REGISTER

New document	Replaced document	Date of publication	Description of modifications
HACCP for Crops Version 5.3	HACCP for Crops Version 5.2	December 2019	Inserted HACCP information for hop production
HACCP for Crops Version 5.4	HACCP for Crops Version 5.3	April 2020	Added language for GFSI compliance, including references to compressed gases, compressed air, steam, and environmental testing.
HACCP for Crops Version 5.4	HACCP for Crops Version 5.3	December 2020	Modification of wording and updates to the hazard analysis, HACCP table, and verification schedule for better understanding and GFSI compliance
HACCP for Integrated Farm Assurance Standard Version 6 GFS edition	HACCP for Crops Version 5.4	September 2023	Updating of examples and all relevant wording to reflect version 6 content.