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ALLIUMS

GUIDELINE TO FACILITATE INTRA-REGIONAL TRADE IN THE CARIBBEAN

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REGIONAL GUIDELINES FOR
PHYTOSANITARY MEASURES

GUIDELINE TO FACILITATE INTRA-REGIONAL TRADE IN THE ALLIUMS

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Adoption

This guideline was adopted by the Council of Trade and Economic Development (COTED) in June 2022.

INTRODUCTION

Scope

This guideline provides guidance to national plant protection organisations (NPPOs) within the Caribbean region for management of the risk of introduction of specific pests associated with cross-border movement of fresh or dried alliums intended for consumption or processing. The guidance provided is intended to facilitate for intra-regional trade of the commodity in the Caribbean region and applies to all species of alliums produced in the region.

The major pests of alliums as well as the pests of regional priority and pests regulated by countries in the Caribbean region – and phytosanitary measures to manage these pests – are included in this guideline. Recommended measures include those that have been adopted as International Standards for Phytosanitary Measures (ISPMs) as well as those that are used in trade amongst Caribbean countries.

This guideline does not address issues related to living modified organisms, climate change, quality of the commodity, or diversion from intended use.

Definitions

Definitions of phytosanitary terms used in the present guideline can be found in ISPM 5 (*Glossary of phytosanitary terms*).

OUTLINE OF REQUIREMENTS

The issue of pest risk varies within and between countries. It is therefore important for importing NPPOs to apply pest risk analysis (PRA) (see ISPM 2: *Framework for pest risk analysis* and ISPM 11: *Pest risk analysis for quarantine pests*) in the process of identifying quarantine pests and providing the technical justification for the imposition of phytosanitary import

requirements. The importing country should consider equivalence of phytosanitary measures if the country of export is unable to conduct specific requests for phytosanitary measures. Such a process should be in keeping with ISPM 24 (*Guidelines for the determination of equivalence of phytosanitary measures*).

Phytosanitary certification and import regulatory systems should be in accordance with ISPM 7 (*Phytosanitary Certification System*), ISPM 12 (*Guidelines for Phytosanitary Certificates*) and ISPM 20 (*Guidelines for a phytosanitary import regulatory system*). Inspections and sampling of consignments should be in keeping with ISPM 23 (*Guidelines for inspection*) and ISPM 31 (*Methodologies for sampling of consignments*), respectively. Wood packaging materials, including pallets, used for consignments must be in conformance with ISPM 15 (*Regulation of Wood packaging material in international trade*).

This document seeks to provide guidance on procedures to establish phytosanitary import requirements. It also identifies and describes specific phytosanitary measures that may be used to reduce pest risk and it provides guidance on sampling, inspection and phytosanitary certification of fresh or dried alliums for export.

BACKGROUND

Description of alliums

Allium is a genus of plants that includes hundreds of species such as the cultivated onion (*A. cepa*), garlic (*A. sativum*), shallot (*A. oschaninii*), scallion (*Allium* spp.), leek (*A. ampeloprasum*) and chives (*A. schoenoprasum*), which are amongst a dozen economically important crop species in this genus that are used as vegetables. The alliums are primarily herbaceous plants, with various underground storage structures comprised of rhizomes, roots and bulbs. The foliar leaves alternate, often sheathing at the base such that they appear to originate from an above-ground stem. *Allium* species are generally typified by a pungent odor of garlic and onion.

The common onion is the most widely cultivated species of the genus *Allium*. The plant has hollow, bluish-green leaves and the bulb at the base of the plant is composed of shortened, compressed, underground stems surrounded by fleshy modified scales or leaves that surround a central bud at the tip of the stem. Scallions, also known as green onions or spring onions,

have a milder taste than most onions and lack a fully developed bulb; they have hollow, tubular leaves growing directly from the bulb.

The shallot is a botanical variety or cultivar of the onion. Like garlic, shallots are formed in clusters of offsets with a head composed of multiple cloves. The skin color of shallots varies from golden brown to rose red with an off-white flesh that is tinged with green or magenta.

Chives are bulb-forming herbaceous perennial plants, growing to 30-50 cm in height; bulbs are slender, conical, and grow in dense clusters from the roots while the stems are hollow and tubular with a soft texture. Rather than forming a tight bulb like the onion, leeks produce a long cylinder of bundled sheaths. The leaf blade of garlic is flat, linear and solid with an acute apex while the bulb is odoriferous and contains outer layers of thin sheathing leaves surrounding an inner sheath which encloses the clove.

Onions and leeks can be grown under a wide range of climatic conditions, requiring a relative humidity of about 70% and an average annual rainfall of 650-750mm. The species tolerate a wide range of soil types but grow best in deep friable loam and alluvial soils with good drainage, moisture holding capacity and an adequate proportion of organic matter. Optimal pH for onions and leeks is in the range of 6.0-7.5. Chives prefer a pH range of 6.0-7.0 and full sun, and garlic prefers mild climates. Garlic can be successfully grown in well-drained soil, rich in organic matter and a pH of 6.0-6.5.

This guideline will focus on measures to facilitate intra-regional trade of fresh or dried *Allium* species grown in the Caribbean.

Identity

Preferred Scientific Name
Allium
Preferred Common Name
Garlic, onion

Taxonomic Tree

Domain: Eukaryota
Kingdom: Plantae
Phylum: Spermatophyta
Subphyllum: Angiospermae
Class: Monocotyledonae
Order: Liliales
Family: Liliaceae
Genus: *Allium*

Intended Use

The guideline covers fresh and dried alliums for the intended purpose of consumption or for processing.

REQUIREMENTS

Pest risk analysis

The NPPO of the importing country should conduct PRA associated with alliums in accordance with ISPM 2, *Framework for pest risk analysis* and ISPM 11, *Pest risk analysis for quarantine pests*, to determine the regulatory status of the pests for the area from which the commodity originates.

Pests of phytosanitary significance affecting trade in alliums

Insects

Onions and other alliums are prone to attack by a number of pests, particularly the onion fly (*Delia antiqua*). The onion fly lays eggs on the leaves and stems and on the ground close to onion, shallot, leek, and garlic plants. The fly is attracted to the crop by the smell of damaged tissue and is liable to occur after thinning. Plants grown from sets are less prone to attack. The larvae tunnel into the bulbs and the foliage wilts and turns yellow. The bulbs are disfigured and rot, especially in wet weather. Control measures may include crop rotation, the use of seed dressings, early sowing or planting, and the removal of infested plants.

The larvae of the onion leaf miner or leek moth (*Acrolepiopsis assectella*) sometimes attack the foliage and may burrow down into the bulb.

Leeks suffer from insect pests including *Thrips tabaci* (onion thrips) and the leek moth. Chives are susceptible to damage by leek moth larvae which bore into the leaves of bulbs of the plant.

Nematodes

The onion eelworm (*Ditylenchus dipsaci*), a tiny parasitic soil-living nematode, causes swollen, distorted foliage in onions. Young plants are killed and older ones produce soft bulbs. No cure is known and affected plants should be uprooted and burned. The site should not be used for growing onions again for several years and should also be avoided for growing carrots, parsnips, and beans, which are also susceptible to the eelworm.

Fungi & Oomycetes

A number of rot-causing fungi affect onions and other alliums. Diseases affecting the foliage include rust and smut, downy mildew, and white tip disease. The bulbs may be affected by splitting, white rot, and neck rot. Shanking is a condition in which the central leaves turn yellow and the inner part of the bulb collapses into an unpleasant-smelling slime. Most of these disorders are best treated by removing and burning affected plants.

White rot of onions, leeks, and garlic is caused by the soil-borne fungus *Sclerotium cepivorum*. As the roots rot, the foliage turns yellow and wilts. The bases of the bulbs are attacked and become covered by a fluffy white mass of mycelia, which later produces small, globular black structures called sclerotia. These resting structures remain in the soil to reinfect a future crop. No cure for this fungal disease exists, so affected plants should be removed and destroyed and the ground used for unrelated crops in subsequent years.

Leeks are susceptible to leek rust caused by *Puccinia allii*.

Neck rot is caused by *Botrytis allii* and is a fungal disease affecting onions in storage. The disease attacks the neck and upper parts of the bulb and causes a grey mold to develop. The symptoms often first occur where the bulb has been damaged and spread downwards in the affected scales. Large quantities of spores are produced and crust-like sclerotia may also develop. Over time, a dry rot sets in and the bulb becomes a dry, mummified structure. This disease may be present throughout the growing period, but only manifests itself when the bulb is in storage. Antifungal seed dressings are available, and the disease can be minimized by preventing physical damage to the bulbs at harvesting, careful drying and curing of the mature onions, and correct storage in a cool, dry, well-ventilated place.

Garlic plants are usually hardy and unaffected by many pests. Once introduced, however, white rot disease (caused by *Stromatinia cepivora*) can destroy a crop as well as remain in the soil indefinitely. Garlic may also be infected by pink root or leek rust while leek moth larvae may attack this species by mining into the leaves or bulbs. Fusarium bulb rot and other bulb diseases are major problems that could affect garlic grown in poorly drained soils. Long crop rotations, the planting of disease-free planting material, and specific integrated insect management actions will limit most of these pests.

Table 1 is a list of pests associated with *Allium* species in the Caribbean region that may be identified as regulated pests requiring phytosanitary measures by the PRA process. Measures

in Table 2 are recommended for the management of these quarantine pests. These measures may be substituted where technically justified.

In the conduct of the pest risk assessment, significant uncertainty may be identified, making it difficult to evaluate phytosanitary measures. Cases of uncertainty do not mandate the application of measures unless it is determined that a pest is likely to be introduced and result in negative economic impacts in the PRA area.

Table 1. Pest groups associated with *Allium* species grown in the Caribbean.

Pest Group	Family	Example species
Bacteria	Burkholderiaceae	*Burkholderia cepacia* (Burkholder)
Beetles	Elateridae	*Agriotes lineatus*
Fungi	Scleretiniaceae	*Botryotinia squamosa* Viennot-Bourgin
		Botrytis aclada Fresenius
		Sclerotium cepivorum Berk.
	Glomerellaceae	*Colletotrichum circinans* (Berk.) Voglino
	Pucciniaceae	*Puccinia allii* Rud., Linnaea
	Urocystidaceae	*Urocystis cepulae* (Frost)
Mites	Tarsonemidae	*Steneotarsonemus furcatus* DeLeon
Thrips	Thripidae	*Frankliniella occidentalis* (Pergorde)
		Thrips tabaci Lindeman, 1889
True Flies	Anthomyiidae	*Delia antiqua* (Meiger)
Viruses	Potyviridae	Onion Dwarf Yellow Virus
Weevils	Curculionidae	*Listroderes costirostris obliquus* (Schonherr)

General Procedures

Once technically justified, general procedures include the following:

Production:

- Registration of producers, farms and exporters and maintenance of a registry of these entities by the NPPO of the exporting country

- Application of good agricultural practices (GAP) (e.g., site and land selection, use of agrochemicals as recommended by the manufacturer, use of pest resistant or tolerant varieties where available, farm sanitation, weed management)
- Monitoring for pests and their vectors, where applicable

Packaging and grading:

- Registration of packing houses
- Development of, and compliance with, packing house requirements
- Pest management in the packing house
- Packing in new and clean material (including protective material, where required)
- Labelling of packaging
- Storage prior to export and transportation in a secure manner to prevent contamination and infestation (e.g., use of insect-proof packaging)
- Grading (guided by CODEX standards[1]) to ensure suitability of alliums for export, including freedom from damage and/or rot, symptoms of pests and contamination with soil, plant debris and extraneous materials.

Treatment facilities:

- Registration and approval of export treatment facilities (where different to packing house) in accordance with procedures established by the exporting NPPO.
- Secure management to prevent contamination and infestation.

Sanitary (Food Safety) Measures

Food contamination can be caused in several ways, the main types of which are biological, chemical, physical and allergenic. Some such contamination could be due to naturally occurring contaminants in the environment or artificially introduced by certain agricultural practices.

Food contamination is a matter of serious food safety concern because high concentration of chemicals and contaminants present in food can pose serious health risks. Commodities that

[1] CODEX Alimentarius "Fresh Fruits and Vegetables". https://www.fao.org/3/a1389e/a1389e00.htm

have been in contact with faeces should not be harvested. The handling, packaging, transporting and storage of commodities intended for consumption are significant contributors to food contamination. It is therefore important that good agricultural practices and good hygiene practices are maintained from the point of production to the point of export to reduce or eliminate contamination of alliums, whether dry bulbs or green. Use of chemical treatments must be approved for use on commodities for consumption and should be applied strictly in accordance with established international standards on maximum residue levels (MRLs).

Persons handling *Allium* species in production and after harvest should be (made) aware of proper personal hygiene and apply good hygienic practices at all times.

Phytosanitary Measures

None of the priority pests of quarantine significance for the Caribbean region are of concern for trade in fresh or dried alliums. Table 2 below provides information on pests associated with alliums along with measures considered to be effective in managing each pest group previously identified in Table 1.

NPPOs of importing countries in the region should recognize the effectiveness of treatments demonstrated by the exporting country to manage the target pests or provide technical justification in support of requests to the exporting country for application of alternative measures. Phytosanitary measures applied to manage the risk(s) from one pest could likely also manage the risks posed by other pests of the commodity.

In the case of phytosanitary import requirements, such should be required solely for pests that countries have identified as regulated pests that require the application of phytosanitary measures thus determined by PRA for the endangered area. In cases where the association of the pest or pest group to the pathway is uncertain, phytosanitary measures should be justified through PRA.

Table 2. Phytosanitary measures considered to be effective in managing the risk from specified pest groups

Pest Group	Phytosanitary Measure(s)
Bacteria	PFA, PFPP
Beetles	Harvest management, visual inspection, removal of soil, GAP, ALPP
Fungi	Prevent damage during harvest, systems approach, PFA, PFPP, GAPs (crop rotation, field sanitation, elimination of wild hosts), removal of roots after harvest
Mites	GAPs, ALPP
Thrips	IPM, PFA, PFPP, harvest management, visual inspection, fumigation

Pest Group	Phytosanitary Measure(s)
True Flies	GAPs (field sanitation, well-drained soil, crop rotation, use of seed dressings), ALPP
Viruses	PFPP, PFA, ALPP, GAPs, IPM of vector
Weevils	PFA, PFPP, IPM

Pest Free Areas (PFA)

Guidance on pest free areas may be sourced in ISPM 4 (*Requirements for the establishment of pest free areas*) and ISPM 8 (*Determination of pest status in an area*).

Pest Free Places of Production (PFPP) and Areas of Low Pest Prevalence (ALPP)

Guidance on pest free places of production and areas of low pest prevalence is found in ISPM 10 (*Requirements for the establishment of pest free places of production and pest free production sites*) and ISPM 22 (*Requirements for the establishment of areas of low pest prevalence*). The utility of these phytosanitary measures may be limited by some characteristics of pests.

Pre-Harvest and Harvest Management

Pre-harvest management

Site selection for the cultivation of alliums as well as proper field sanitation are particularly important in preventing or reducing the chances of infestation with soil-borne pathogens of quarantine significance as well as overwintering arthropod pests. Pest resistant allium varieties should be used where available. Weed control is vital and should preferably be done by hand to reduce damage to the bulbs and also reduce the need to use herbicides.

Green onions, like dry bulb onions, can be produced on any well-drained soil. Clay soils could make it more difficult to harvest and clean the commodity. Proper fertilization and weed control are necessary for healthy crop production of alliums.

Prior to harvest, a pre-harvest assessment would provide a final opportunity to evaluate any safety risks from the field which could have potentially led to contamination of the alliums during the production phase.

Harvesting

Alliums are harvested at stages depending on the purpose for which the crop is planted. When onion bulbs are fully formed, the green leafy tops begin to yellow and collapse at a point above the bulb. Harvesting may be done by hand in sandy soil types while soils may have to be loosened with appropriate tools to permit harvesting from more compact soil types. Care should be taken during the harvesting process not to damage the bulbs and/or leaves.

Garlic is ready to be harvested when 40-60% of the six or so leaves have yellowed while mature onions are ready for harvest when at least half of the leaves are dead. Harvesting should be done when the weather is dry to reduce susceptibility of the bulbs to post-harvest disease.

Culled alliums should be removed from the field to prevent the buildup of pests.

After harvesting, it is important that the field heat of green onions is reduced as quickly as possible by icing to cool the commodity to 5ºC. In addition, damaged, broken or partially yellowed leaves should be removed prior to washing. If trimming is required by the importing country, this should be done carefully to avoid damage to the leaf tissue.

Post-harvest handling and treatments

Handling and sorting

After harvesting onions, field heat should be reduced as quickly as possible. Green onions should be held at temperatures of approximately 0ºC and a relative humidity of 95-100% for best storage life; storage at higher temperatures cause a slimy foliage rot to occur.

Damaged, soft or decayed alliums should be removed to the degree possible prior to removal from the field. Alliums contacted by any fecal material should not be harvested.

If alliums are to be field packed, they are not intended to be transferred to a packing house for further handling. It would therefore be extremely important to ensure that practices and conditions do not contaminate the commodity. Field packing is generally done for mature onions. All containers to be used in the field packaging process must be stored in a manner to prevent contamination and should be protected from direct contact with the ground. Picking and packing containers must be distinguishable from those serving for other purposes.

Transportation

Vehicles used to transport field packed alliums should be sufficiently clean and should be inspected for cleanliness, odors, visible dirt and debris prior to loading. Records should be kept of all cleaning activities of vehicles used in transportation of the commodities.

Curing

Garlic intended to be stored long-term must be cured after harvest. In this regard, freshly harvested and sorted garlic are placed on racks in a location with good airflow and out of direct sunlight and weather for about three weeks or until the outer two leaves are completely dried.

Onions intended for storage should be dried well and cured in the field, under sheds, or in storage. After two weeks of field drying, onions may be transferred to storage rooms for final drying and curing. The curing process allows for development of the scale leaves and firming of the bulbs.

Cleaning

Dirt and chaff should be removed from the commodity, to the degree practicable, prior to removal from the field. Documented procedures for cleaning of dried or fresh-cut alliums should be developed and strictly adhered to. Once cured, the tops and roots of garlic bulbs and dry onions should be trimmed and any remaining soil removed. Dry bulb onions should not be washed while alliums to be washed should be cleaned using water of potable quality.

The bulbs of green onions should be well trimmed and must be cleaned by washing thoroughly with potable, and preferably chilled, chlorinated water (150 ppm hypochlorous acid, pH 6.5) to remove soil particles, dirt and surface stains.

Storage

Any area used to collect and store alliums packed in the field must be kept in a clean and sanitary manner. All debris should be removed and sanitarily disposed of while packed products should be palletized, or contain a barrier, to avoid direct contact with the floor.

After curing and cleaning, garlic bulbs should be placed in appropriate packaging (for example, clean cardboard boxes or burlap bags) and stored at 1-1.7^{o}C and a relative humidity of 65-75%.

Green onions should be kept refrigerated, and unless otherwise recommended, storage temperatures must be greater than 0^{o}C, but should not exceed 4.4^{o}C for best storage life.

After drying and curing, the temperature of dry onions should be lowered gradually to ambient temperatures. Condensation should be avoided to prevent rot and changes in the color of the dry skin. The onions should be promptly stored after curing and kept from exposure to light which will induce greening of the outer scales.

Treatments

Treatments include a range of processes that are targeted at the control or eradication of pests and contaminants from approved commodities, empty containers and export vessels. Treatments can include – but are not limited to – fumigation, irradiation, use of controlled atmosphere or temperature, application of a chemical substance, dismantling/ repairing or cleaning, repacking or blending. The choice of the treatment applied is the responsibility of the importing country in keeping with international standards.

Specific treatments for *Allium* species may be selected and mutually agreed upon between the countries of import and export in accordance with approved international standards and treatments or where bilaterally agreed.

Irradiation

Treatments for the use of ionizing radiation (irradiation) may be used for pest risk management. Phytosanitary irradiation is a treatment which uses ionizing radiation on commodities such as fruits and vegetables to inactivate pests. The method is used for international food trade as a means to prevent spread of non-native organisms. NPPOs should be assured that the efficacy of the treatment is scientifically demonstrated for the regulated pest(s) of concern and the required response. The application of irradiation as a phytosanitary treatment should be in accordance with ISPM 18 (*Guidelines for the use of irradiation as a phytosanitary measure*).

Fumigation treatment

Fumigation is the treatment with a chemical agent that reaches the commodity and target pest(s) in a gaseous state. The fumigant may be effective against all pest groups or used to target a particular pest group and may address all or most life stages. The application of fumigation as a phytosanitary treatment should be in accordance with ISPM 43 (*Requirements for the use of fumigation as a phytosanitary measure*).

Storage facilities, both on- and off-farm, should be approved and outfitted with the required cool stores and warehousing facilities linked to postharvest crop management. Fumigation

should only be done when necessary and only by a licensed or trained operator. All fumigation instances, chemical agents used, and dates of application should be documented.

Chemical treatment

Chemical treatments are used on a wide range of agricultural products from pre-planting through to post-harvest stages. These treatments are intended to destroy, repel and control pests of agricultural commodities. The chemicals are commonly applied by **dipping** (i.e., fully immersing the commodity into a solution) or spraying at a specific concentration for a specified period, to reduce the risk of a broad range of pests in the target area or on the target commodity. Chemical treatments may also be used to destroy pests within empty holds of a vessel or container.

Temperature treatment

Temperature treatments may be used as a phytosanitary treatment option. The application of heat treatments and systems to support the treatments should be in accordance with ISPM 42 (*Requirements for the use of temperature treatments as phytosanitary measures*) and technically justified by PRA.

Vapour Heat Treatment (VHT) is the process in which water vapours are used to heat a commodity until it reaches a minimum temperature for a specified period of time to effectively control live infestations of certain pests. It is an option generally used for commodities that are resistant to high moisture and vulnerable to drying out.

Cold treatment involves the use of refrigerated air to lower the temperature of a product to, or below, a specific temperature for a specific period to mitigate the risks of infestations of target pests. This treatment is used primarily for fresh fruits and vegetables that are hosts of internally feeding pests. The treatment is generally commodity and pest specific.

Packing, packaging and labelling

Alliums should be packaged using clean or new containers. Green onions are typically shipped in waxed cartons with easy opening tops for the addition of crushed ice to maintain optimal conditions for the commodity. Dry onions are generally packed in sacks or burlap bags.

A label to be affixed to each carton/container should clearly detail the name of the commodity and other relevant information, including but not limited to: the variety, the farmer's registration number, the name and address of the exporter, the harvest date, the packing date, the gross weight or net weight, the number of bulbs/bunches per carton, and the names of the

grower and the processor/exporter. Any other quantitative information should be also included on the label in keeping with the importing country's requirements.

Transportation

In the transportation of *Allium* species for consumption, all applicable handling, packaging and storage procedures must serve to prevent damage and proliferation of pests during the process. During the shipping process, allium consignments should not be placed in areas with extreme temperatures. The cartons should not be dropped, thrown, packed in inverted position, rolled or tipped. Regardless of the means of transport, the produce must be kept as cool as possible, dry, and moved to market as quickly as possible.

Systems Approaches

Guidance for the use in development and evaluation of integrated measures in a systems approach can be found in ISPM 14 (*The use of integrated measures in a systems approach for pest risk management*). At least two measures which are independent of each other may be used to manage specific quarantine pests and any uncertainty.

Verification of compliance

Sampling and inspection should be carried out by the NPPO to verify compliance of consignments of alliums with phytosanitary import requirements.

The NPPO may authorize entities to conduct specific phytosanitary activities (e.g., sampling, inspection and testing in accordance with the ISPM 45 (*Requirements for national plant protection organizations if authorizing entities to perform phytosanitary actions*).

Sampling and phytosanitary inspection

ISPM 31 (*Methodologies for sampling of consignments*) and ISPM 23 (*Guidelines for Inspection*) may be used for official guidance on sampling and phytosanitary inspection.

In accordance with official procedures, the NPPO of the exporting country should sample and inspect each consignment of alliums to verify conformance with importing requirements and freedom from quarantine pests. If infield controls require the registration of the production

area or farm(s), sampling and inspection should be conducted in each homogenous grower lot. In instances where live pests are found, the exporting country NPPO should determine whether additional actions are required to meet the conditions of the importing country NPPO.

The number of packages presented for inspection should be consistent with documentation for the consignment. The documentation should certify that basic measures have been applied and that any required traceability labelling is complete. Initial inspection of the consignment should also verify that the phytosanitary security is maintained for the consignment.

Minimum sample size for inspection should be based on a 95% confidence level as set out in ISPM 31 (*Methodologies for sampling of consignments*), or as specified by the NPPO of the importing country, with technical justification.

Phytosanitary certification

All commodities intended for export attain a phytosanitary status when they are produced in a PFA or PFPP; after harvest, for commodities from certified farms required to eliminate, manage or monitor specific pests; after a phytosanitary treatment, and after export inspection. A phytosanitary certificate should only be issued when the requirements of the importing country, as set out in an Import Permit issued by its NPPO, have been verified as being met as confirmed in the certifying statement. Phytosanitary certification (for export and re-export) should be in keeping with ISPM 12 (*Phytosanitary certificates*). Re-exported consignments must be accompanied by (a copy of) the original phytosanitary certificate.

An additional declaration may be required by the country of import to verify compliance with the import requirements as specified by the importing country's NPPO.

For consignments of alliums for consumption to receive phytosanitary certification, the consignments must:

- Meet the specific requirements as indicated in the Import Permit issued by the importing country
- Originate only from officially approved places of production
- Be clean (i.e., practically free from viable regulated pests, and associated tissue damage, soil, chemical contaminants, or any other unapproved extraneous material and substances)

- Be treated in a manner consistent with the application standard and treatment certificate presented
- Be accompanied by pest free area declaration, where required
- Be packaged in clean and new material (including packaging material used to prevent damage during transport)
- Be exported in a secure manner to prevent contamination.

Alliums, whether dried or green, must be intact and clean, and free from rot, visible foreign matter and damage caused by pests. If viable regulated pests are detected, a phytosanitary certificate should not be issued unless appropriate phytosanitary measures have been applied.

If a consignment of alliums is opened, split up or packaging changed prior to arriving in the country of import, a phytosanitary certificate for re-export is required from the re-exporting country.

Phytosanitary certificates, and Phytosanitary Certificates for Re-export should be in accordance with ISPM 12 (*Phytosanitary certificates*).

Phytosanitary security

Once commodities have received phytosanitary certification, and until such commodities are exported, the phytosanitary security of the commodities must be maintained at all times. As such, the commodities must be adequately protected to prevent infestation or contamination and labelled (in keeping with the legislation and importing country requirements) to prevent substitution. Breaches of security during transport or storage disqualifies the phytosanitary status of the commodities.

Phytosanitary security is maintained:

1. when secure packaging (containers, pallets) is used and/or
2. the consignment is isolated by physical barriers, distance or insect-proof space), AND
3. appropriate measures are taken while loading export containers.

Secure packaging

Secure packaging requirements could comprise of the following:

Container level security

- The commodity is fully enclosed in a container with the lids tightly fixed to the base
- Ventilation holes or other openings are covered with insect-proof mesh that has no more than a 1.6mm diameter pore size diagonally; alternatively, ventilation holes are fully sealed.
- Vented containers having plastic liners or bags must be fully sealed. The overlapping folded edges of the plastic liner with the container lid on top would be considered fully sealed.

Pallet level security

For containers that are palletized, security would be achieved using one of the following options:

- Each pallet is fully shrink-wrapped, with the base and the top of the pallet sealed (e.g., using a sheet of cardboard), as well as all sides, to completely enclose the commodity consignment.
- Each pallet is secured with insect-proof mesh using a pallet net with no more than a 1.6 mm pore size diagonally, to include the surface area between the bottom row of the containers and the pallet.

Isolation requirements

Commodities that are not secure-packaged may be kept secure if they are isolated from all potential sources of infestation or contamination and from other goods of different or unknown phytosanitary status.

Isolation by physical barriers

Physical barriers (e.g., walls or solid structures) can be used to form a barrier to exclude pest access. This option can be applied when the commodities are stored and handled in insect-proof spaces, shipping containers, enclosed vans or cool rooms.

Isolation by distance

The phytosanitary status of consignments may be maintained by creating a minimal acceptable distance between goods of different or unknown phytosanitary status within insect-proof

spaces. This can be achieved if goods are kept at optimal temperatures with at least 1m separation from any other goods.

Isolation by insect-proof spaces

The phytosanitary security of a consignment can be maintained if, at all times, the goods are kept in insect-proof spaces and are kept isolated from all potential sources of infestation or contaminants, to include products of different or unknown phytosanitary status. Pack houses, treatment facilities and cool room storage doors must be suitably insect-proof through the use of double doors, automatic doors, rubber curtains, air curtains or other approved mechanism.

Loading procedures

During the loading process, it is important to maintain phytosanitary security of the consignment by ensuring the following occurs:

- Containers with vent holes and openings must be sealed, with openings no more than 1.6 mm pore size diagonally (e.g., drain holes or air intakes)
- Consignments must be loaded directly into the export container
- Commodities not securely packaged and not immediately loaded must be stored securely to prevent contamination or infestation
- Personnel loading export containers must ensure that the consignments are moved from the secured area into the export containers as quickly as possible
- Consignments must not be left unsecured and loading procedures must mitigate potential infestation.

One or more methods to safeguard dry and green alliums against infestation after the application of a phytosanitary measure should be applied. Such methods should take into account the biological characteristics of pests and the strength of the phytosanitary measures that have been applied.

Consignments in transit

In the movement of regulated commodities within the Caribbean, such commodities may transit various countries *en route* to the country of import. Procedures to identify, assess and manage pest risks associated with consignments of these commodities which pass through a country without being imported, should be conducted in such a manner that any phytosanitary measures applied in the country of transit are technically justified and necessary to prevent the

introduction into and/or spread of pests within that country. ISPM 25 (*Consignments in transit*) provides guidance for handling of consignments in transit.

Audit and compliance of the export pathway

In keeping with ISPM 20 (*Guidelines for a phytosanitary import regulatory system*), the importing country's NPPO may request an audit of specific elements of the export system for alliums. This could relate to entities registered/approved to export as well as the records relating to exported consignments. Verification of compliance of the consignment may be sought by the importing country in the country of export.

REFERENCES

This guideline refers to International Standards for Phytosanitary Measures (ISPMs). ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms

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APPENDICES

Appendix 1. List of pests found on *Allium* species in the Caribbean region

[source: National Plant Protection Organizations of Member States]

Pest Type	Scientific name	Common name(s)	Host[2]
Bacterium	*Enterobacter cloacae*	bulb rot	Onion
Bacterium	*Erwinia carotovora subsp. atroseptica*	(potato blackleg disease)	Onion
Bacterium	*Erwinia* sp.	Bacterial wilt	onion
Bacterium	*Pectobacterium carotovorum*	bulb rot	Onion
Bacterium	*Pseudomonas alliicola*	neck and outer scale rot	Onion
Bacterium	*Pseudomonas marginalis*	(kansas lettuce disease)	Onion
Bacterium	*Pseudomonas marginalis* pv. *marginalis*	marginal leaf blight	Onion
Bacterium	*Pseudomonas syringae*	bacterial blast	Onion
Bacterium	*Xanthomonas axonopodis* pv. a*llii* (Rou Magnac *et al.)*	Leaf blight (blast) of onion	
Fungus	*Alternaria dauci*	Leaf blight of carrot	Chive
Fungus	*Alternaria porri*	Purple blotch	Onion
Fungus	*Alternaria tennuissima*	Nailhead spot	Onion
Fungus	*Aspergillus niger*	rot and seedling blight	Onion
Fungus	*Athelia rolfsii*	Sclerotium rot	Onion
Fungus	*Botrytis cinerea*	Grey mould rot	onion
Fungus	*Chalara elegans*	Black root rot	Onion
Fungus	*Colletotrichum dematium*	Leaf spot	Onion
Fungus	*Corticium rolfsii (*Sacc.)	Sclerotium rot	Onion
Fungus	*Fusarium oxysporum*	Basal rot	Onion
Fungus	*Fusarium oxysporum* f.sp. *cepae*	Basal rot	Onion
Fungus	*Fusarium solani*	Basal rot	Onion
Fungus	*Glomerella cingulata*	Anthracnose	Onion
Fungus	*Macrophomina phaseolina*	Charcoal rot of bean/tobacco	Onion
Fungus	*Penicillium digitatum*	Green mould	Onion
Fungus	*Penicillium italicum*	Blue mould	Onion
Fungus	*Peronospora destructor*	Downy mildew of onion	Onion
Fungus	*Pleospora herbarum*	Leaf blight of onion	Onion
Fungus	*Sclerotium cepivorum*	White rot	Onion
Fungus	*Stemphyllium vesicarium*	Onion leaf blight	Onion
Fungus	*Urocystis magica*	Onion smut	Onion
Insect	-	Thrips	Onion
Insect	*Agromyza sp.*	Leaf miner flies	All
Insect	*Aphis craccivora*	Groundnut Aphid	Onion
Insect	*Aphis gossypii* (Glover)	Cotton aphid	Onion
Insect	*Aphis spiraecola*	Green citrus aphid	Chive

[2] As declared by BMCs

Pest Type	Scientific name	Common name(s)	Host[2]
Insect	*Atherigona orientalis* (Schiner)	Pepper fruit fly	Onion
Insect	*Carpophilus obsoletus*	Corn sap beetle	Onion
Insect	*Carpophilus sp. (?)*	Sap beetle	Onion
Insect	*Feltia subterranea* (Fabricius)	Granulate cutworm	Onion
Insect	*Frankliniella occidentalis*	Californian thrips	Onion
Insect	*Frankliniella schultzei*	Cotton thrips	Onion
Insect	*Liriomyza huidobrens*	Leaf miner	Onion
Insect	*Liriomyza sativae* (Blanchard)	Vegetable leaf miner	Onion, chive
Insect	*Liriomyza sp.*	Leaf miner flies	All
Insect	*Liriomyza trifolii*	American serpentine leafminer	Onion
Insect	*Oxycarenus hyalinipennis*	Cotton seed bug	Onion
Insect	*Scirtothrips dorsalis*	Chilli thrips	Onion
Insect	*Spodoptera eridania*	Southern armyworm	Chive
Insect	*Spodoptera exigua*	Beet army worm	Onion
Insect	*Spodoptera frugiperda* (J.E.Smith)	Fall armyworm	All
Insect	*Spodoptera ornithogalli*	Black cutworm	Onion
Insect	*Spodoptera sunia (Guen.)*	Armyworm	All
Insect	*Stegobium paniceum*	drugstore beetle	Onion
Insect	*Thrips palmi* (Karny)	Melon thrips	Onion
Insect	*Thrips tabaci* (Linderman)	Onion thrips	All
Insect	*Trichoplusia ni*	cabbage looper	Onion
Mite	*Tetranychus sp.*	Red spider mites	All
Mollusc	*Achatina fulica*	Giant African Snail	Onion
Nematode	*Criconemoides sp.*	Ring nematode	Onion
Nematode	*Ditylenchus sp.*	Stem and bulb nematode	Onion
Nematode	*Helicotylenchus dihystera*	Common spiral nematode	Chive
Nematode	*Helicotylenchus pseudorobustus*	(spiral nematode)	Onion
Nematode	*Helicotylenchus sp*	Spiral nematode	Onion
Nematode	*Longidorus*	(longidorids)	Onion
Nematode	*Meloidogyne exigua*	(coffee root-knot nematode)	Onion
Nematode	*Meloidogyne spp.*	Root knot nematode	Onion
Nematode	*Paratrichodorus minor*	(stubby root nematode)	Onion
Nematode	*Pratylenchus brachyurus*	(root-lesion nematode)	Onion
Nematode	*Pratylenchus penetrans*	(nematode, northern root lesion)	Onion
Nematode	*Pratylenchus sp*	Root lesion nematode	Onion
Nematode	*Pratylenchus zeae*	(root lesion nematode)	Onion
Nematode	*Rotylenchulus reniformis*	Reniform nematode	Onion
Nematode	*Rotylenchulus sp*	Reniform nematode	Onion

Pest Type	Scientific name	Common name(s)	Host[2]
Nematode	*Trichodorus*	(stubby root nematodes)	Onion
Nematode	*Tylenchorhynchus sp.*	Stunt nematode	Onion
Nematode	*Tylenchus* spp.	-	Onion
Oomycete	*Phytophthora cinnamomi*	Phytophthora dieback	Onion
Weed	*Cynodon dactylon*	(Bermuda grass)	Onion
Weed	*Cyperus rotundus*	(purple nutsedge)	Onion
Weed	*Eleusine indica*	(Goose grass)	Onion
Weed	*Emex australis*	(Doublegee)	Onion
Weed	*Emilia sonchifolia*	(red tasselflower)	Onion
Weed	*Euphorbia heterophylla*	(wild poinsettia)	Onion
Weed	*Euphorbia hirta*	(garden spurge)	Onion
Weed	*Parthenium hysterophorus*	(Parthenium weed)	Onion
Weed	*Portluca oleracea*	(Purslane)	Onion
Weed	*Plasmodiophora brassicae*	(cabbage club root)	Onion
Weed	*Sida acuta*	(sida)	Onion
Weed	*Solanum nigrum*	(black nightshade)	Onion
Weed	*Sonchus oleraceus*	(common sowthistle)	Onion

Appendix 2. List of pests of *Allium* species regulated by countries in the Caribbean region

[Source: National Plant Protection Organisations of Member States]

Pest Type	Scientific name	Common name(s)	Host
Bacterium	*Burkholderia cepacia* (Burkholder)	Sour skin of onion	Onion
Fungus	*Botryotinia squamosa* Viennot-Bourgin	Leaf blight, neck rot	Onion
	Botrytis aclada Fresenius	Grey mold of onion, neck rot	All
	Colletotrichum circinans (Berk.) Voglino	Onion smudge, anthracnose	All
	Puccinia allii Rud., Linnaea	Rust, onion rust	All
	Sclerotium cepivorum Berk.	White rot, bulb rot	All
	Thrips tabaci Lindeman, 1889	Onion thrips	All
	Urocystis cepulae (Frost)	Onion smut	Onion
Insect	*Agriotes lineatus*	wireworm	
	Delia antiqua (Meiger)	Onion Fly	
	Frankliniella occidentalis (Pergorde)	Western flower thrips	
	Listroderes costirostris obliquus (Schonherrr)	Vegetable weevil	
Mite	*Steneotarsonemus furcatus* DeLeon	Taro tarsonemid mite	
Virus	Onion Dwarf Yellow Virus	ODYV	