



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

CFIA-ACIA

Developing Your Biosecurity Plan: The National Voluntary Farm-Level Biosecurity Standard for the Fruit and Tree Nut Industries

Table of Contents

Preface – How to Use this Document.....	2
1.0 Introduction.....	3
1.1 Biosecurity and Integrated Pest Management.....	4
1.2 Why is biosecurity important to producers?	4
1.3 Who is responsible for biosecurity?.....	5
1.4 Who is the document for?	5
2.0 The Creation of a Biosecurity Plan and the Implementation of Biosecurity Measures.....	5
Figure 1: Flow chart of how the documents and tools referenced in this standard work together to help you develop your biosecurity plan.....	6
Figure 2: An illustration of the activities to follow to develop and maintain your biosecurity plan	8
3.0 Develop your Biosecurity Plan	9
3.1 Information.....	9
3.2 Identification	10
Figure 3: The Plant Pest Triangle	11
3.3 Pathways of Transmission	11
Table 1: Example of Analysis of Transmission Pathways for Fruit and Tree Nut Pests.	12
3.3.1 Biological and Mechanical Vectors.....	13
3.3.2 Physical Pathways	14
3.4 Pest Monitoring	19
3.5 Response Plan.....	20
4.0 Communication, Education and Training	22
5.0 Site Selection: Geography, Location and Layout.....	23
6.0 Conclusion.....	24
7.0 Glossary.....	25
Appendix 1: Self-Assessment Checklist.....	27
Appendix 2: Acknowledgements.....	30

Preface – How to Use this Document

This standard applies to a diverse group of fruits and tree nuts. Not all considerations may apply to each commodity and place of production. To develop an effective biosecurity plan for your farm operation you must identify the pests of concern and analyze their pathways of transmission for your specific commodity and place of production.

Information on pest transmission pathways, biosecurity considerations, and a glossary of terms are included in the standard. ***The terms in the standard that are defined in the glossary appear in bold and italic the first time they are used in the standard.***

The **Target Outcomes** are goals that all producers of fruit and tree nuts should try to implement to protect their plants from the introduction and spread of pests.

The **Benefits** sections provide the reader with details regarding why a specific target outcome is important to biosecurity.

The **Considerations** sections provide examples, guidance and suggestions for reaching the Target Outcomes. The intent is not to prescribe, but rather, to provide guidance. These are not necessarily all-inclusive, but are accepted as best management practices for the fruit and tree nut producers. They are based on an understanding of risk pathways, supporting science and time proven management practices. These are designed to be attainable and realistic.

1.0 Introduction

Canadian fruit and tree nut producers currently implement many biosecurity measures to prevent and manage pests. The objective of the National Voluntary Farm-Level Biosecurity Standard for the Fruit and Tree Nut Industries is to provide producers with a nationally consistent proactive approach to prevent the introduction and spread of pests through implementation of biosecurity measures. A nationally consistent approach to preventing and managing pests is important for Canadian producers to maintain domestic and international markets.

Biosecurity refers to a series of management practices designed to prevent, minimize and manage the introduction and spread of **pests**. This includes pests not established in Canada, pests established in limited areas of Canada, and pests widely distributed that can spread from farm to farm.

Biosecurity best practices reduce the risk of pests on your farm operation by targeting the possible pathways of introduction, including nursery stock, soil, mulch, air, water, biological and mechanical vectors.

The Canadian Food Inspection Agency (CFIA) works with stakeholders to develop national voluntary farm-level biosecurity standards and producer guidance documents for several crop and animal-based sectors. The development process is supported by Agriculture and Agri-Food Canada (AAFC) under the Growing Forward 2 Agricultural Policy Framework. To ensure that what is developed is relevant and useful for producers and the sector as a whole, Biosecurity Advisory Committees (BACs) have been developed which pull together expertise from industry and producer organizations, producers, academia, and federal and provincial specialists. See Appendix 2 for partnership acknowledgments.

The National Voluntary Farm-Level Biosecurity Standard for the Fruit and Tree Nut Industries (subsequently referred to as the “Standard”) is a national reference document which provides guidance to producers to develop their **biosecurity plan**. A nationally consistent approach to biosecurity activities and awareness requires the continued partnership and commitment of the federal government, provincial governments and industry. This national standard provides a basic biosecurity framework that may be used by the provinces, industry associations and commodity organizations to develop specific awareness and implementation programs to assist the producer.

The standard is accompanied by a producer guide. The producer guide provides more detailed, commodity specific best practices and other options to be considered to achieve the risk mitigation goals identified in the standard. These reference documents should be used with other commodity specific references that may be available from your provincial and trade associations.

1.1 Biosecurity and Integrated Pest Management

Farm biosecurity and ***integrated pest management (IPM)*** both aim to protect crop health. Many biosecurity risk mitigation strategies are synonymous with IPM preventative strategies. The two approaches differ in that farm biosecurity has a greater focus on practices intended to exclude pests from the farm or limit their spread and establishment. In contrast, IPM primarily involves strategically using different practices to control a pest that is already present in a production system or is an imminent threat.¹ For example, IPM prevention activities are often more focused on industry's best management practices such as monitoring, managing environment (for example; soil fertility and pH), and choosing plants appropriate for the growing conditions.

1.2 Why is biosecurity important to producers?

The implementation of biosecurity practices to prevent, minimize, and control the introduction of pests is important for the sustainability of the fruit and tree nut industries in Canada. The implementation of farm-level biosecurity in Canada protects our environment and agricultural sector and supports our reputation as a safe and reliable trading nation. This has significant economic, environmental and community benefits for all Canadians. The development of a farm biosecurity plan will define and formalize many of the risk reduction practices that are already in place in your day-to-day operations, and assist you in addressing potential biosecurity gaps that may exist in your current operation.

The implementation of biosecurity best practices is a way to support the objectives of your farm business plan.

Effective prevention of pest occurrences supports productivity, stabilizes production costs, and protects the value of your farm land. Your farm biosecurity plan will also contribute to protecting the long-term investment in your farm operation.

¹ Farm Biosecurity/ IPM workshop <http://ipmworkshops.com.au/farm-biosecurity>

Your farm biosecurity plan may assist you in retaining customers and accessing new markets. The enhancement of biosecurity practices at the farm level will help you in addressing customer expectations, whether locally, nationally, or internationally.

Other considerations for implementing biosecurity measures and planning within a farm operation include:

- Maintaining market access;
- Customer demand for biosecurity practices and **protocols**;
- Decreasing production losses;
- Avoiding the introduction of new pests;
- Containing and minimizing current biosecurity risks; and
- Responsibilities to neighbours and industry to ensure that biosecurity risks are not spread to someone else.

1.3 Who is responsible for biosecurity?

Biosecurity is a shared responsibility. Anyone responsible for the health of plants needs to be aware of the risk and accept the responsibility of the potential impact to Canadian agriculture. Implementation of biosecurity measures by everyone will help minimize the potential risk of pest introduction and spread to protect Canada's environment, plant resource base and economy from biosecurity threats.

1.4 Who is the document for?

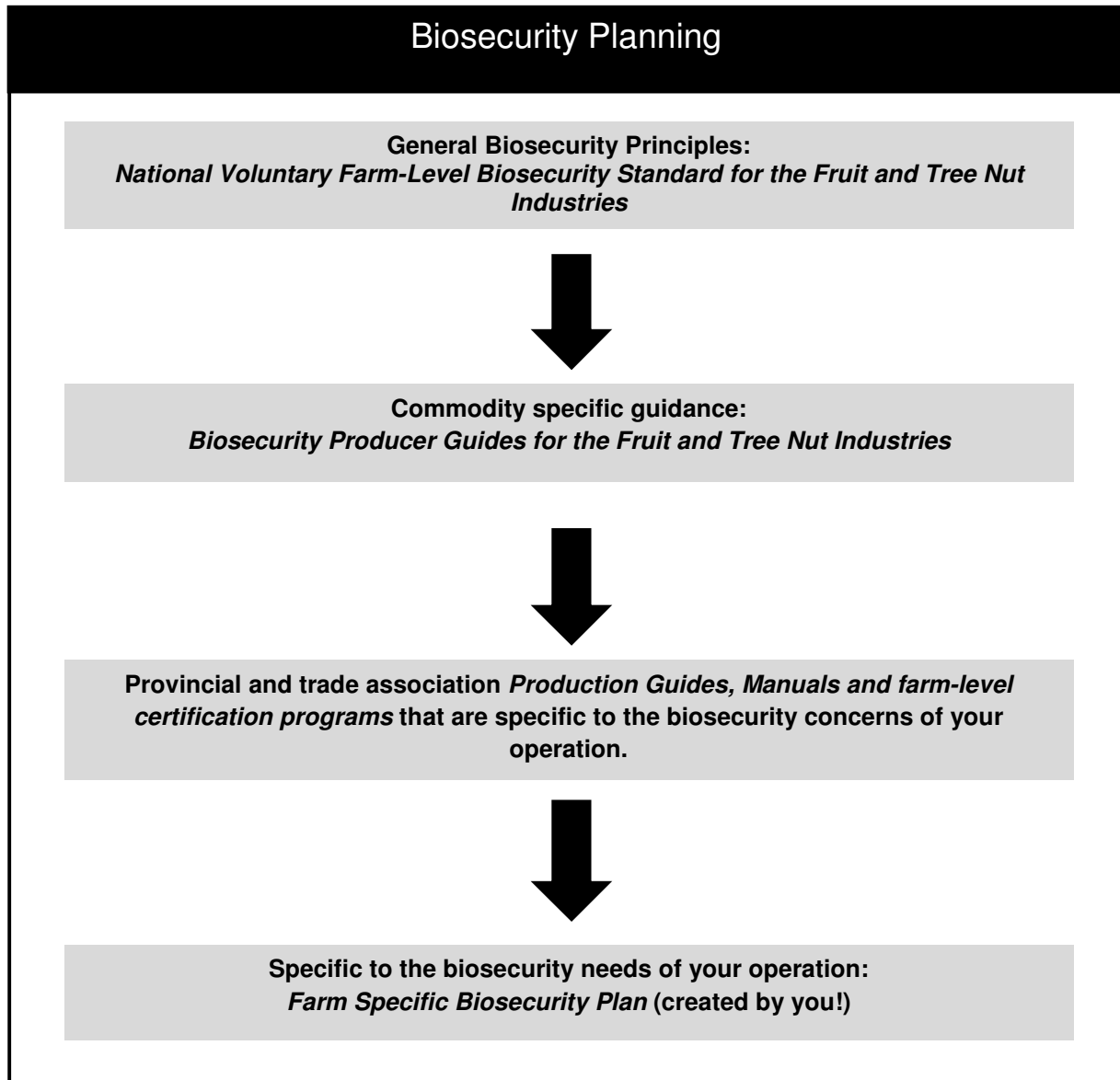
The biosecurity standard is for everyone. Anyone responsible for the health of plants from small farms operations, to large facilities, should consider developing a written biosecurity plan. This biosecurity reference tool is not designed to provide guidance on the risks associated with the production of nursery stock. For guidance related to these activities please refer to the National Voluntary Farm Level Biosecurity Standard for the Greenhouse, Nursery and Floriculture Industries.

2.0 The Creation of a Biosecurity Plan and the Implementation of Biosecurity Measures

This standard provides a framework for the development of individual farm biosecurity plans or to enhance but not supersede existing farm level programs, such as CanadaGAP™ and other regional or provincial programs. Figure 1 shows how the

documents and tools referenced in this standard support the development of farm specific biosecurity plans.

Figure 1: Flow chart of how the documents and tools referenced in this standard work together to help you develop your biosecurity plan.



Development of your biosecurity plan for your farm should start with the general biosecurity principles of the National Voluntary Farm-Level Biosecurity Standard for the Fruit and Tree Nut Industries. Then commodity specific guidance from the Biosecurity Producer Guide for the Fruit and Tree Nut Industries and provincial and trade association production Guides, manuals and farm-level certification programs that are

specific to the biosecurity concerns of your operation should be considered. This will help you address and include the specific biosecurity needs of your operation in your farm specific biosecurity plan.

The development and implementation of your biosecurity plan can be seen as a cycle of activities:

- 1) **Assess** pest risks and reassess on a regular basis to ensure preparedness;
- 2) **Plan** to address biosecurity gaps;
- 3) **Implement** measures and procedures; and
- 4) **Monitor** and gather pest information.

Figure 2 provides a visual representation of the cycle of biosecurity activities, where the need to assess and reassess can be seen as both the starting point of the cycle as well as the activity that continues the cycle. Your biosecurity plan is created to prevent and manage the pest risk within your farm operation. By assessing and re-assessing pest risk on a regular basis, preparedness can be achieved and activities which were once reactive become measured and predictable.

Figure 2: An illustration of the activities to follow to develop and maintain your biosecurity plan

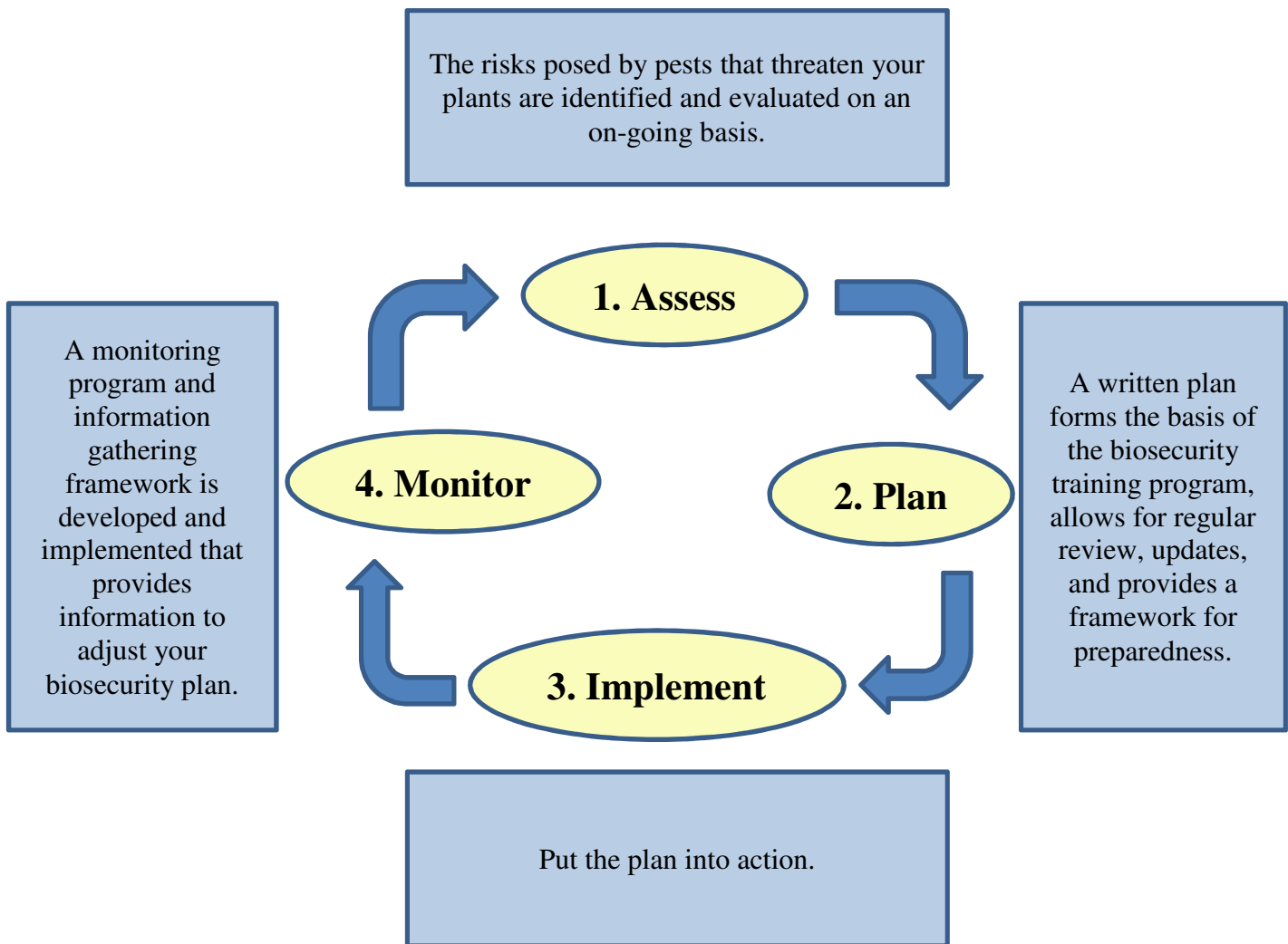


Figure 2 is an illustration of the cycle of activities that should be completed to develop and implement a biosecurity plan. The cycle of biosecurity activities has four items in the centre with arrows pointing between them in clockwise direction. The first item at the top of the cycle is Assess. Moving clockwise, the second item is Plan, the third item is Implement and the fourth item is Monitor. There is a text box by each of these items in the cycle (four in total). Above the word Assess there is a box with the following text: The risks posed by pests that threaten your plants are identified and evaluated on an on-going basis. To the right of the word Plan there is a box with the following text inside: A written plan forms the basis of the biosecurity training program, allows for regular review, updates and provides a framework for preparedness. Below the word Implement is a text box with the following text inside: Put the plan into action. To the left of the word

Monitor is a text box with the following text: A monitoring program and information gathering framework is developed and implemented that provides information to adjust the biosecurity plan.

- **Assess:** Identify and evaluate the risks of pest introduction, and analyze their transmission pathways. This will allow for current biosecurity gaps within your farm operation to be identified and addressed. Production practices should also be reviewed frequently (re-assess) to ensure that implemented measures are effective in relation to pest prevention and control.
- **Plan:** A written biosecurity plan is highly recommended. A written plan allows for regular review and update, facilitates preparedness within the farm operation and forms the base for training. Note: The self- assessment tool (Appendix 1) provides a framework or starting point for the development of your biosecurity plan.
- **Implement:** Put the plan into action. Education, training and communication are key to effective implementation of your biosecurity plan.
- **Monitor:** Create an information gathering system that identifies emerging pest risks to your farm operation. This system should include the implementation of a *monitoring program* that will identify pests that may be introduced to your farm operation. It is important that the design, effectiveness and implementation of a biosecurity plan be assessed not only on a routine basis but also when changes in farm practices or biosecurity threats occur.

3.0 Develop your Biosecurity Plan

3.1 Information

Your biosecurity plan should include an information gathering system to allow you to identify the current and potential pest risks to your plants as well as the pathways of transmission. This system should include:

- 1) A communication network to:
 - gather information from sources including local agrologists, extension workers, researchers, fellow producers and producer associations
 - identify critical points to apply biosecurity intervention that will mitigate the risks associated with pathways of transmission (refer to section 3.3);
 - help identify pests on your farm operation;
 - review local horticulture publications and websites; and
 - attend industry meetings.

2) Federal, provincial and municipal government resources to provide information regarding:

- regulations and changes to regulations;
- requirements for inputs and outputs;
- specific criteria of other farm level programs (for example: Integrated Pest Management or CanadaGAP™); and
- requirements for market access that are in addition to and may be more stringent than regulations.

3) Farm operation layout to:

- identify specific routes for the movement of inputs, people, vehicles, equipment and outputs;
- locate signs to assist with directing traffic flow and increase awareness of designated areas;
- illustrate the layout of your farm operation (map) including designated areas to assist in training new employees, directing visitors and service providers, planning future production processes and managing pest detections.

Gathering information will be an on-going process that will allow you to adjust your biosecurity plan to mitigate risks as they are identified.

3.2 Identification

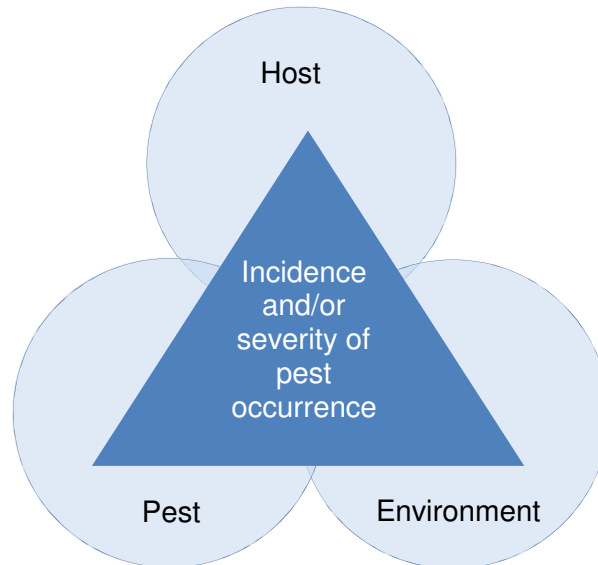
There are many insects, viruses, bacteria, fungi, weeds, nematodes and phytoplasma that can impact fruit and tree nuts. The types of pests identified as a risk to your plants will depend on several factors, including:

- the type of plants being grown;
- the potential for pest introduction;
- region;
- climate; and
- production practices.

To effectively control or contain a pest it must be correctly identified and the potential pathway of transmission must be understood. Proactive biosecurity measures applied to a critical point in the pathway of transmission can prevent the introduction and limit the spread of pests.

Figure 3 illustrates the relationship between a pest, host and the environment.

Figure 3: The Plant Pest Triangle



The Plant Pest Triangle has a triangle with the words “Incidence and/or severity of pest occurrence” written on it. Each point of the triangle has a circle surrounding it. Starting at the top, the first circle says: Crop. To the right, the second circle says: Environment. To the left, the third circle says: Pest.

The establishment of a pest requires the interaction of a susceptible host, a pest and an environment favourable for pest development. Environment can influence the relationship in the following ways:

- increase or decrease pest survival;
- detrimentally affect the health of the plant and increase susceptibility to pests;
- and
- act as a natural pathway of transmission (for example: wind and water).

The introduction or severity of a pest occurrence can be reduced with proactive biosecurity measures such as the selection of resistant varieties or influencing the impact of an environmental factor.

3.3 Pathways of Transmission

The implementation of proactive biosecurity measures can mitigate the potential for introduction and spread of pests if applied to a critical point in a pathway of transmission. Pathways of transmission include:

- **Biological and mechanical vectors:** insects, birds, animals, plant material and organisms in soil; and
- **Physical pathways:** people, vehicles, tools, equipment, irrigation, harvest containers, inputs (for example: propagation material, plants, soil, mulch) and outputs (for example: pruning debris, unharvested fruit, fruit and harvest waste, as well as packing materials).

Table 1 provides an example of pest transmission pathway analysis. Knowledge and analysis of pest transmission pathways allows for the identification of the critical control points where biosecurity measures should be implemented.

Table 1: Example of Analysis of Transmission Pathways for Fruit and Tree Nut Pests

Pests	Stock plants/ nursery	Soil/ Mulches	Air	Water	People	Common Vectors	Other pathways
Aphids	✓	✓	✓		✓		Alternate hosts, machinery
Mites	✓		✓		✓		Pruning and plant debris
Brown rot	✓		✓	✓		Insects	
Bacterial canker	✓			✓			
Botrytis	✓		✓	✓			
Crown gall	✓	✓					Tools, machinery
Weeds	✓	✓	✓	✓			Birds, animals, manure, vehicles

3.3.1 Biological and Mechanical Vectors

Target Outcome:

Implementation of biosecurity measures at the critical points in the pathway of transmission of biological and mechanical vectors.

The following are some examples of biological and mechanical pathways:

- Insects can serve as pathways to introduce viruses and bacteria;
- Birds and mammals can spread weeds via feet, feces and fur.
- Neighbouring crops may serve as a host for pests that may infect your plants.

Benefits

Reduce crop damage, increase productivity and minimize economic losses through the implementation of biosecurity measures that disrupt the pathways of transmission.

Considerations

- Prevent wildlife from entering your production area. The use of fencing or tree guards that wrap around the trunk of a tree can minimize or deter wildlife from causing physical damage to your plants.
- Manage vectors (for example; aphids, leafhoppers, mealybugs, scales, and nematodes) with management practices such as chemical, cultural and **biological controls**.
- Beneficial insects can be negatively impacted by certain control measures.
- Crop rotation or fallowing production areas may reduce the build-up of pests that can occur when one species is continuously grown in a production area.
- Identify potential host plants within and around your production areas and remove or implement control measures for these potential hosts.
- Locate your production areas away from neighbouring crops that may be potential hosts or vectors of pests.
- Remove or eliminate pruning debris from production areas.
- Locate compost piles away from production areas as they may serve as homes for unwanted animals and pests.
- Dispose or manage infected fruit, nut or plant debris to control pests. Compost can be an effective way to dispose of infected material if done properly. Infected material that is not properly composted properly can be a significant source of pests.²

² Restrictions may apply to the disposal methods of federally, provincially or municipally regulated pests.

- Pollinators such as bees may be a pathway of viruses (for example: Blueberry Shock Virus). It is recommended to work closely with your pollinator provider to follow good management practices.³

3.3.2 Physical Pathways

Inputs, people, equipment, tools and vehicles can be a potential source of pest introduction and spread onto your farm operation. On the other hand, outputs can present a risk of introduction and spread to other areas from your farm operation. It is important to implement biosecurity measures that will mitigate these risks and help break the cycle of pest transmission on your farm operation.

1) *Inputs*

Target Outcome:

To eliminate inputs as a potential source of pests.

Receiving inputs such as nursery stock, compost, manure, fertilizer, mulch, soil, packaging materials or water has the potential to introduce pests to your plants.

Your biosecurity plan should have protocols that mitigate the risks associated with moving inputs onto your farm operation.

Benefit

Ensuring inputs are obtained from a reputable source reduces the introduction of pests to your farm operation.

Considerations

- Ensure that nursery stock that arrives on your farm are from reputable suppliers and certified for freedom from pests when available as signs of viruses, viroids and phytoplasmas may not be visible on dormant material. Material should also be certified for quality, trueness to type and pest resistance when possible.

³ For more information on bee biosecurity refer to the National Bee Farm-Level Biosecurity Standard <http://www.inspection.gc.ca/animals/terrestrial-animals/biosecurity/standards-and-principles/bee-industry/eng/1365794112591/1365794221593>

- Receive and store inputs in a designated area located away from your production areas to prevent introduction and spread of pests to your plants.
- Inspect inputs for signs and presence of pests prior to accepting or moving the materials into your production areas.
- Ask your compost or mulch supplier for testing history or quality assurances to ensure it is not a source of pests.
- Keep records of when and where compost or mulch batches were used on your farm operation in the event of a pest detection.
- Ensure manure that is being used as fertilizer has been composted to reduce the risk of pest introduction.
- Include in your monitoring plan observation of areas where compost and manure has been applied to identify symptoms of pests.
- Movement of soil between farm operations or designated areas is not recommended. Soil is considered to be a high risk pathway for spreading a wide range of pests (for example: bacteria, fungi, insects, nematodes and weeds).
- Know the previous use of recycled harvest containers to identify possible pathways of pest introduction.
- Know the source, availability and quality of water applied on your production area. Water availability and quality are important considerations for healthy plants and soil as contaminated water can alter the composition of soil and also present food safety risks.
- Prevent livestock and animal access to water sources used for irrigation or filling sprayers.
- Maintain and **clean (disinfect or sanitize)** water system.
- Maintain purchasing, production and storage records for relevant inputs. Records of the source of an input, numbers of plants and date planted can be important when responding to a pest detection. Records form the basis to identify the source of origin and potential distribution of a pest.
- Recycled harvest containers, transport containers and packaging materials:
 - Consider the risk of re-using containers and packaging materials that cannot be cleaned between uses. Contaminated containers and /or packaging materials increases the potential for pest introduction and spread.
 - Ensure recycled harvest containers and transport containers are cleaned in a designated area located away from production areas.
 - Designate an area specifically for the storage of recycled harvest containers, transport containers and packaging materials.
 - Designate a clean packaging area.

II) People

Target Outcome:

Employees, visitors and service providers are informed and respect applicable biosecurity protocols.

Benefit

Managing the biosecurity risks associated with the movement of people between farm operations and designated areas can mitigate the risk of pests that can be carried on footwear, clothing and hair.

Considerations

- Employees should be trained on the biosecurity protocols for your farm operation; refer to section 4.0 Training and Communication for information.
- Visitors and service providers should report to the office or have farm employees meet them in a designated area to receive a briefing on the biosecurity protocols, access to supplies, and assistance to implement the protocols.
- Visitors, service providers and employees should park in designated areas and only access areas necessary for their activities as their vehicles can carry pests.
- Keep a visitors log to identify the date visited, the areas visited and the last contact with fruit and tree nuts prior to visiting your farm operation. This information may be useful when responding to a pest detection.
- Ask visitors and service providers if they have visited another farm that day as clothing, footwear and hair can carry pests that may have been present on another farm.
- Ensure visitors, service providers and employees who have been on other farm operations do not have soil or plant debris on footwear, clothing or hair.
- Consider the biosecurity implications that customers present to a pick-your-own farm operation.

III) Vehicles, Tools and Equipment

Target Outcome:

Vehicles, tools and equipment are cleaned prior to entry and kept clean to prevent the introduction and spread of pests on your farm operation.

Vehicles, tools and equipment entering and moving within your farm operation pose a biosecurity risk as they can be contaminated with soil and plant debris that can harbor pests. Non-agricultural vehicles and equipment that enter and conduct activities not related to your production may also pose the same pest risk. For example;

- earth-moving equipment;
- gas exploration equipment;
- utility service vehicles; and
- delivery vehicles.

Recognize that vehicles, tools and equipment on your farm may have been on other farm operations.

Benefit

Biosecurity risks can be reduced by management of vehicles, tools and equipment entering and moving within your farm operation.

Considerations

- Establish designated parking areas for visitors, employees and service provider vehicles.
- Minimize traffic movement into farm production areas.
- Inspect vehicles, tools and equipment for soil, plant debris, organic material and insects and if necessary clean prior to entry and movement between farm operations or designated areas.
- If off-farm vehicles must be used on your farm operation, restrict them to designated access roads and prohibit access to production areas. Ensure that the vehicle is free of soil and plant debris if entry is required.
- Prevent the entry of recreational vehicles on the premises, particularly into production areas.
- Ensure that vehicles follow the appropriate routes and traffic-flow patterns as established. Move from clean production areas to those more likely to harbour pests or potential biosecurity risks.
- Clean pruning and propagation tools between areas where pest transmission is a concern.

IV) *Outputs*

Target Outcome:

Product leaving the farm operation is free of pests of concern.

By-products or waste are disposed or treated to reduce the risk of spreading pests.

Outputs can be categorized into two distinct types:

- 1) The final product which should be free of pests of concern; and
- 2) By-products or waste which may contain pests when leaving the farm operation and require specific disposal or treatments to mitigate the release of pests to areas surrounding your farm operation and neighbouring farms.

Although outputs can be categorized into two distinct types both pose the same risk of pest introduction or spread to the areas surrounding your farm operation, to neighbouring farms or other regions.

Benefit

Managing outputs mitigates the potential risks associated with infestation and re-infestation of your farm operation as well as potential infestation of neighbouring farms, other crops, and the environment.

Considerations

- Know the pest regulations for the intended market of your final product to ensure it can meet phytosanitary certification requirements.
- During the growing season and at the time of harvest, monitor for symptoms or the presence of pests on the farm or harvested crop.
- Follow established industry protocols for grading, labelling and segregation of final product as these are biosecurity activities that mitigate the risk of spreading pests.⁴ Conduct these activities in a designated area away from production areas.
- Identification and labelling of final product is important for traceability in the event of a pest detection (as well as spray residue issues or food-borne illness).

⁴ Contact your industry representative or CFIA for more information regarding established grading, labelling and segregation protocols.

- Dispose or manage infected fruit, nut or plant debris to control pests. Compost⁵ can be an effective way to dispose of infected material if done properly. Infected material that is not composted properly can be a significant source of pests.⁶
- Dispose of culls, fruit and nut waste by deep burial, transportation to a municipal disposal facility or other methods that minimizes the risk of pest introduction and spread.
- Locate compost or cull piles away from production areas.
- By-products should be transported in leak-proof, clean bins to prevent the leakage of juice as it may contain pest larvae.
- Know the pest status of the region(s) receiving your product. Additional biosecurity measures may be necessary for regions that are free of a pest that is present at your farm operation.

3.4 Pest Monitoring

Target Outcome:

Minimize production losses through the early detection of pests.

Implementation of a monitoring program on your farm operation will help to ensure that pest introductions or threshold limits are identified quickly and the potential for economic and ecological issues is lowered significantly.

Benefits

Early detection is vital to minimize the impact and to successfully contain or eradicate pests. Early detection of pests through regular monitoring leads to the implementation of management practices or specific pest **response plans** before pest population impacts market access, local economic losses and the environment.

Considerations

- Your monitoring program should include activities to identify both existing and potential pests of concern. Use your information gathering system to continuously be aware of emerging pests.
- Incorporate the knowledge of the pest **life cycle**, specifically the stages of development, where they are found and the symptoms exhibited into your monitoring program.

⁵ Restrictions may apply to the disposal methods of federally, provincially or municipally regulated pests

⁶ For an example of proper composting please refer to
<http://www.omafra.gov.on.ca/english/engineer/facts/05-023.htm>

- Correct identification of pests will help you determine the most appropriate and effective controls.
- Know the risk of each pest and analyze the results of your pest monitoring as not all pests will carry the same risk.
- A monitoring program should include routine observation of production and shipping areas for signs of pests.
- Keep records of monitoring activities, observations and responses. Reviewing these records is an essential step in evaluating and developing response plans.

When monitoring has identified signs of pests take action to correctly identify the pest and evaluate the risk in order to take appropriate action.

3.5 Response Plan

Target Outcome:

The evaluation of the pest risk is used to develop your response plan.

When a common pest that is not regulated is detected there is a decision making process to determine if a response is required, the timing of the response and the most appropriate control. When a pest is found control actions may not always be required as not all pests carry the same risk. The economic and ecological implications should be assessed when deciding whether to respond to a pest detection on your farm operation. The decision of whether to manage or control a pest will depend upon factors including but not limited to:

- biology of the pest;
- availability of control measures;
- cost and benefit considerations;
- regulatory status of the pest; and
- the availability of an area wide pest control strategy.

Identification and quantification of pests identified through your monitoring program provides the information to enable you to decide if you have reached your **treatment threshold**. A threshold is the critical point that you have decided a level of pest population may result in unacceptable economic loss or ecological impact. Thresholds are very specific and may fluctuate depending on crop, pest, growth stage of the pest, expected market value and cost of control. With so many factors to consider it may be

difficult to establish thresholds. Seek information from your Integrated Pest Management (IPM) advisor, grower organization or provincial specialist to help you determine thresholds specific to your crops and pests of concern.

Benefits

Establishing a threshold and preparing detailed response plans prior to the identification of a pest may facilitate an effective response which may reduce economic loss and ecological impacts.

Timely pest identification, containment or eradication can mitigate the risk of disruption of domestic or international markets.

Considerations

- Preserve samples to allow for accurate identification of pests.
- Use laboratories, extension specialists, researchers and the Canadian Food Inspection Agency (CFIA) for confirmation of pest identification.
- When a regulated pest is identified the CFIA and your respective provincial or territorial government must be contacted to report the detection. If you suspect you have detected a regulated pest it is important to limit the potential spread of the pest through the control or restriction of movement of plant and fruit material as well as people and equipment in and out of the infected area on your farm.
- Contact your industry organization(s) for your commodity group, to determine if an **Emergency Response Plan** exists.
- Record the location of pest detections as this is important for immediate response or control.
- Use signage to indicate the location of pest detections, where applicable.
- Where there is a risk of transmitting pests of concern, implement controls to clean equipment between farm operations or production areas within your farm.
- Include the response procedures as part of your employee education and training (refer to section 4.0 for further information).
- Clean vehicles and equipment upon exiting the **infested area** to prevent spread of the pest. Cleaning will be determined based on the pest pathway of transmission.
- Clean vehicles and equipment entering your farm if a pest risk has been identified in the vicinity of your farm operation.

- If possible, dispose of plant debris and waste within the infested production area to prevent spread. If material cannot be disposed of onsite it should be contained for transport to a municipal disposal facility.
- Pesticide applications may be required.
- Proper management prevents the pest from becoming resistant to pesticides.

4.0 Communication, Education and Training

Target Outcome:

People entering or working within your farm operation respect the biosecurity measures in place.

Your farm operation biosecurity protocols should be communicated to all visitors and service providers that are entering or working on your farm.

Employees will be trained on biosecurity measures in place to prevent transmission of pests. Training protocols should be reviewed regularly and updated when emerging risks are identified, new technology or knowledge is available or operational practices change.

Benefits

A well developed, communicated and implemented training program will convey the need for biosecurity to visitors, service providers and employees.

Considerations

- Incorporate your biosecurity protocols into your training program and schedule training as needed. Staffing changes, newly identified risks or emerging pests, and changes in operational practices are a few examples of triggers that would identify the need for training in addition to routinely scheduled training sessions.
- Make a copy of your biosecurity plan accessible to employees.
- Depending on the biosecurity measures, visitors and services providers may need to be accompanied by an employee to assist them in respecting your biosecurity plan.
- Ensure that visitors and service providers respect the biosecurity measures for the areas of your farm they will visit.
- Monitor, review and change your biosecurity plan and training program as situations change and new information becomes available.

- Communicate your biosecurity protocols to neighbours.

5.0 Site Selection: Geography, Location and Layout

Target Outcome:

Use knowledge of geography, location and layout to plant new sites and to protect existing or neighbouring sites.

The consideration of biosecurity risks when making a selection of the location for a production area may make biosecurity and production practices easier. Potential sources of biosecurity risks may be neighbouring sites (operating or abandoned), nurseries, other commercial plantings, native vegetation and urban plantings. Aspects of geography (for example: elevation or topography), environmental factors (for example: water availability and wind direction), location and layout may contribute to the health of plants. Know the history of the land use to ensure it is compatible for your intended use (not a landfill site, toxic waste, presence of pests in the soil). When choosing a new location for a production area, consider drainage, neighbours, neighbouring land uses, exposure, local plant life, proximity to water and weeds.

Benefits

Knowledge of your geographical location, land use history and layout when deciding where to plant will help optimize the likelihood of meeting your biosecurity objectives.

Considerations

- Evaluate existing sites to identify biosecurity risks and implement measures to mitigate those risks.

Geography and Environmental Factors

- Plant on sites that have reduced risk of pest introduction by the prevailing wind direction as wind can carry spores or insects.
- Select sites that are free of the pests of concern.
- Make use of topography to assist with drainage and reduction of standing water in production areas.
- Assess soil conditions including subsoil compaction and water holding capacity to ensure optimum drainage.

- Consider water availability and accessibility.
- Ensure the climate is compatible for the type of fruit or nut that will be grown.

Location

- Conduct an assessment of the history and previous use of newly acquired or leased land. This will provide knowledge of the pests which might be of concern, and will also provide information on the potential build-up of chemical control products.
- Identify neighbouring land uses such as livestock and poultry operations, or non-farm uses (for example: dumpsites and industry refineries) that can have the potential to contaminate your fruit or nuts and/or have a negative effect on soil condition.
- Identify potential host plants within and around your production areas and remove or implement control measures for potential hosts.
- Locate your production areas away from neighbouring crops that may be potential hosts or vectors of pests.
- Be aware of the management practices of neighbouring sites as they may impact your management strategies. For example, pesticides may reduce populations of beneficial insects.
- Use natural barriers such as roadways or neighbouring farm boundaries (for example; windbreak or hedge) to help control access to your site.

Layout

- Designate an area located away from production areas to clean tools, equipment, boots and vehicles prior to entry to the production areas.
- Locate debris and compost away from production sites to prevent pest introduction and spread.
- Locate designated receiving areas for inspection of inputs (for example: nursery stock) away from production sites. The receiving area should also allow for cleaning and treatment, if necessary.

6.0 Conclusion

Biosecurity measures help to prevent and manage the introduction and spread of pests in Canada. This National Voluntary Farm-level Biosecurity Standard for the Fruit and Tree Nut Industries provides producers with a nationally consistent approach to develop and implement a biosecurity plan. The self-assessment checklist in Appendix 1 will help you determine appropriate biosecurity measures for your farm operation. For more

information on applying biosecurity principals from the standard to your operation refer to the producer guide for the fruit and tree nut industries.

7.0 Glossary

Biological control	Biological control is a component of an integrated pest management strategy to reduce pest populations through the use of natural enemies such as predators (for example: predatory mites), parasitoids (for example: wasps), and pathogens (for example: bacteria).
Biosecurity	A series of management practices designed to reduce the introduction of pests onto a farm (bioexclusion) and to minimize their spread within the farm and beyond (biocontainment). ⁷
Biosecurity plan	A written procedure of designed practices to prevent, minimize, control, and contain pest movement onto, spread within and off a farm. The plan is farm specific.
Clean	To physically remove visible dirt and debris that may harbour pests. Cleaning does not necessarily result in the physical destruction/killing/removal of pests. It is important to recognize that the degree of cleanliness required and the methods employed will be dependent on the pest itself, its route of transmission and the surfaces being cleaned. In some instances, the removal of visible dirt/debris should be followed by the use of disinfectant or sanitizer to properly control the pest of concern.
Emergency Response Plan	A plan which describes actions to be taken in the case of a major event (likely pest related) that may threaten to harm an operation.
Disinfect <i>(Application of a disinfectant)</i>	The process that is used to inactivate, decrease or eliminate a pest from a surface or an object. The use of a disinfectant may require additional personal precautions to minimize safety concerns associated with application of the product.
Infested area	Presence in an area of a living pest of the plant or plant product concerned. Infestation includes infection. ⁸
Integrated Pest Management ⁹	Integrated Pest Management (IPM) involves the use of several control tactics based on knowledge of the crop, pests and associated natural enemies to avoid crop loss and minimize harmful effects on the environment.
Life cycle	The series of changes occurring in an animal or plant between one development stage and the identical stage in the next

⁷ National Farm-Level Biosecurity Planning Guide - Proactive Management of Plants Resources

⁸ IPPC – ISPM 5

⁹ Orchard Pest Management, A Resource Book for the Pacific Northwest edited by Elizabeth H. Beers, Jay F. Brunner, Michael J. Willet and Geraldine M. Warner

National Voluntary Farm-Level Biosecurity Standard
for the Fruit and Tree Nut Industries

	generation.
Monitoring program	A scheduled activity to look for the presence or signs of pests. This may include observation of plants, fruits and nuts, trapping, sampling and testing of plant material. The frequency of this activity is dependent on the time of year, the lifecycle of the pests of concern and level of risk.
Pests ¹⁰	Anything that is injurious or potentially injurious, whether directly or indirectly, to plants or to products or by-products of plants, and includes any plant prescribed as a pest, insects, diseases, viruses and weeds.
Protocol	A code of correct conduct or a standardized set of procedures or practices when implemented in sequence are designed to achieve a specific objective.
Response plan	A set of protocols to prepare and respond to a pest problem which allows for a rapid response to the introduction.
Sanitize (<i>application of a sanitizer</i>)	A process that reduces the number of pathogens without completely eliminating all microbial forms on the surface.
Treatment threshold ¹¹	A point at which pest populations, economic considerations or environmental conditions indicate that pest control action must be taken.
Vector	Medium/route of transmission

¹⁰ The *Plant Protection Act* defines a pest as anything that is injurious or potentially injurious, whether directly or indirectly, to plants or to products or by-products of plants, and includes any plant prescribed as a pest. The International Plant Protection Organization (IPPC) definition of pest is as follows: Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products.

¹¹ <http://www.epa.gov/pesticides/factsheets/ipm.htm#setaction>

Appendix 1: Self-Assessment Checklist

Use the checklist below to conduct a self-assessment of the biosecurity measures currently in place on your farm operation. Indicate with a checkmark whether the biosecurity measure occurs (Yes), does not occur (No) or is not applicable to your farm operation (NA). Measures that pertain to your farm operation but are not implemented should be identified as 'No' as opposed to 'Not Applicable'. Completing the checklist will help you to identify areas where biosecurity measures may be required and will help provide a framework for the development of your biosecurity plan. When you have completed the checklist, review your responses. Where you have checked 'No', refer to the related section of the standard and producer guide to develop actions to implement the biosecurity measure.

Carefully evaluate whether a biosecurity measure is not applicable to your farm. It is recognized that not all measures will apply to each of the various commodities and production types included in the scope of the standard.

Date of assessment: _____

Biosecurity Measure	Yes	No	NA	Comments
Section 3.0 Develop your Biosecurity Plan				
An information gathering system has been created to identify current and potential pests and pathways of pest transmission.				
A map of your farm operation has been developed.				
Pathways of transmission have been analyzed to identify critical points where biosecurity measures should be implemented.				
Section 3.3.1 Biological and Mechanical Vectors				
Pests and vectors are managed with chemical, cultural and biological controls.				
Potential host plants within and around production areas are removed or controlled.				
Production areas are located away from neighbouring crops that are potential pest hosts.				
Compost piles are located away from production areas.				
Section 3.3.2 Physical Pathways				
Inputs				
Nursery stock is sourced from reputable suppliers and certified for freedom from pests when available.				
Inputs are received and stored in a designated area located away from production areas.				
Inputs are inspected for signs and the presence of pests prior to moving into your production area(s).				
Soil is not moved between farms or designated areas.				

National Voluntary Farm-Level Biosecurity Standard
for the Fruit and Tree Nut Industries

You know the source, availability and quality of water applied to your production area.				
Recycled harvest containers and transport containers are cleaned prior to use.				
Purchasing, production and storage records for relevant inputs are maintained.				
People				
Employees are trained on the biosecurity protocols for your farm operation.				
Visitors and service personnel are informed of biosecurity protocols for your farm operation.				
Visitors and service personnel sign a visitors log on arrival.				
Visitors, service providers and employees' footwear, clothing or hair are free of soil or plant debris.				
Vehicles, Tools and Equipment				
Designated parking areas have been established for visitors, employees and service provider vehicles.				
Traffic movement into production areas is minimized.				
Vehicles, tools and equipment are inspected for soil plant debris, organic material and insects prior to entry onto your farm or into designated areas.				
Pruning and propagation tools are cleaned between areas where pest transmission is a concern.				
Outputs				
The farm and harvested crops are monitored for pests throughout the growing season and at the time of harvest.				
Grading, labelling and segregation of final product are conducted in a designated area away from production areas.				
Final product is labelled.				
Culls, fruit and nut waste is disposed of by deep burial, at a municipal disposal facility or other method to minimize pest spread.				
Section 3.4 Pest Monitoring				
Your information gathering system is used to remain up-to-date on existing and potential pests of concern.				
Knowledge of pest life cycles is incorporated into your monitoring program.				
You have knowledge of pest risks and analyze the results of your monitoring activities.				
Records of monitoring activities, observations and responses are maintained.				
Section 3.5 Response Plan				
Laboratories, extension specialists, researchers and the CFIA are used to confirm pest identification.				
The CFIA, provincial or territorial government is contacted when a regulated pest is detected.				
Employees are educated and trained on the response procedures to pest detections.				
Equipment is cleaned between farms or production areas.				
Plant material is disposed of within the infested production area.				

National Voluntary Farm-Level Biosecurity Standard
for the Fruit and Tree Nut Industries

Material that cannot be disposed of within the production area is contained for transportation to a municipal disposal facility.				
Section 4.0 Education, Training and Communication				
Your biosecurity protocols are incorporated into the training program.				
Changes to your biosecurity plan and training program are made as new information becomes available.				
Employee training is scheduled.				
Your farm biosecurity measures are communicated to visitors, and if needed visitors are assisted by employees to respect your biosecurity plan.				
Section 5.0 Site Selection				
Geography and Environmental Factors				
Sites that are not at risk of pest introduction by prevailing wind direction are chosen for planting.				
Sites chosen for planting are free of pests of concern.				
Topography is used to assist with drainage and reduction of standing water.				
Location				
An assessment of the history and previous land use is conducted for newly acquired or leased land.				
Potential host plants within and around production areas are removed or controlled.				
Production areas are located away from neighbouring crops that are potential pest hosts.				
Layout				
Designated areas for cleaning tools, equipment, boots and vehicles are located away from production areas.				
Debris and compost are located away from production areas.				
Areas designated for the inspection of inputs are located away from production areas.				

Appendix 2: Acknowledgements

- Agriculture and Agri-food Canada
- British Columbia Blueberry Council
- British Columbia Cranberry Marketing Commission
- British Columbia Cherry Association
- British Columbia Fruit Growers' Association
- British Columbia Ministry of Agriculture
- Canadian Horticultural Council
- Les Producteurs de pommes du Québec
- Food Processors of Canada
- Grape Growers of Ontario
- Ministère de l'Agriculture des Pêcheries et de l'Alimentation du Québec
- Ontario Berry Growers Association
- Ontario Hazelnut Association
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Ontario Tender Fruit Growers
- Perennia
- Society of Ontario Nut Growers (SONG)
- University of Guelph, Berry and Tree Nut Research
- Wild Blueberry Grower Association of New Brunswick