



DIY BIOSECURITY

**FARM BIOSECURITY ACTION PLAN FOR
THE VEGETABLE & POTATO INDUSTRIES**



BIOSECURITY: WHAT IS IT AND HOW CAN I BENEFIT?

Plant biosecurity is a series of measures that aid in protecting production areas from harmful insects, weeds, and various plant diseases. They are collectively referred to as 'plant pests,' that have the potential to adversely affect plant health.

On-farm biosecurity best practices play a pivotal role in maintaining Australia's reputation of producing high quality products. Growers maintaining a pest-free environment can capitalise on this reputation and use it as a trade asset to gain leverage into global and local markets. Additionally, biosecurity practices can act as security against farm quarantine measures.

Proper biosecurity signage; insect, weed and pest surveillance; and on-farm clean-down facilities are three commonly used, farm biosecurity measures.





BIOSECURITY SIGNAGE

Biosecurity signage informs visitors and guests that they are entering a bio secure farm and that individuals are expected to abide by the established procedures.

- Signs should direct visitors and guests to register their presence to the owner or farm manager prior to entering the property. Signs with bold and contrasting colours are recommended for the greatest effect.
- Install and maintain signage throughout the property. Effective signs should be clear, visible and well maintained in locations where visitors cannot help but notice. For this to occur, signs should be located at all entrances to the farm.
- Supplement signage with additional on-farm biosecurity practices. For example, signs should direct guests to specific visitor parking whereupon they can register their presence with the owner and undergo a farm induction. Signs should also clearly indicate where foot washes and vehicle or machinery clean-down facilities are located.



Download a farm biosecurity sign template from
ausveg.com.au/biosecurity



PEST SURVEILLANCE

Proper surveillance is essential for maintaining plant health and can provide security against quarantine measures. There are several important aspects to consider when implementing surveillance on your property.

Monitor

Routinely monitor for pests to maintain plant health and identify risks before they become endemic. It is important to be aware of the pests, diseases and weeds that are located in your region and, most importantly, those found in and around your property to accurately identify risks.

Identify

Proper identification can streamline spray applications or alternative treatment methods to rid plants of pests. Exotic pests should also be included in routine monitoring: consult your industry biosecurity plan for a list of priority exotic pests. It can also be helpful to consult with neighbouring properties on anything suspicious as the problem is unlikely to remain contained to one area.

Record

Record all observations of pests and disease, including a lack of observations. The date of any observation made, identity of any pest, growing areas affected, the level of infestation and the proposed treatment plan should be recorded. If no observations were made, this should also be noted. Proper surveillance and record keeping can be important for retaining market access.

Report

Report any significant findings to the relevant state or territory agriculture agency, on the Exotic Plant Pest Hotline 1800 084 881.



ON-FARM CLEAN-DOWN FACILITIES

A clean-down facility is where people can clean and disinfect farm equipment and machinery entering or leaving growing areas. Plant soil and debris can often be collected on vehicle and machinery surfaces as well on the shoes worn by workers and visitors. This poses a biosecurity risk as bacteria, fungi, viruses, viroids, nematodes, insects and insect eggs can remain stable in soil and plant matter for extended periods of time. Routine usage of these facilities is essential for reducing the chance of introducing pests to the property and the potential for pests to spread. Proper clean-down practices can also improve production yields and aid in market access. The following three steps demonstrate proper clean-down procedures:

Clean-down

Clean all incoming and outgoing vehicles and machinery using high pressure water hoses or compressed air to remove plant soil and debris.*

Decontaminate

Apply decontaminant solution, e.g. antibacterial, antifungal and antiviral, to all vehicle surfaces where plant material may be located.

Rinse

Prior to moving the vehicle, use a high pressure water hose to direct debris to sump areas. Concrete or gravel are preferred clean-down facility surfaces.

*Install foot baths for clean-down of shoes and boots.





FARM BIOSECURITY ACTION PLAN AND CHECKLIST: GUIDANCE MATERIAL

Developed as a part of the Vegetable and Potato Biosecurity Program, this document is intended as a guide for reducing the risk of plant pest transmission.

TRANSMISSION PATHWAY	ACTIONS TO REDUCE TRANSMISSION
<p>VEHICLES AND EQUIPMENT</p> <p>Vehicles and equipment surfaces often collect soil and plant debris. In particular, organic material can collect in grilles, in tyre treads and on wheel rims. This represents a biosecurity risk because many plant pests, such as bacteria, fungi, viruses, viroids, nematodes, and insects (and insect eggs), can remain stable in soil for long periods. Some viruses can even remain viable on vehicle surfaces without the presence of organic matter.</p>	<ul style="list-style-type: none"> • Maintain vehicle and equipment clean-down facilities at dedicated facilities on site away from growing areas. • Ensure runoff from clean-down facilities lead into a sump that is away from growing areas. • Keep dedicated equipment and farm vehicles on the property. • Clean and disinfect vehicles and equipment between use in different growing areas. • Restrict visitor vehicle parking to designated areas. • Ensure on-site vehicles travel on designated pathways between growing areas. • Direct traffic with gate signs and inform visitors about property access points, and who to contact for queries.
<p>PACKAGING, BINS AND PALLETS</p> <p>Packaging and pallets are an important part of the supply chain and are commonly re-used. Often packaging, bins and pallets cross state borders, and are transferred between properties. It is therefore important that biosecurity practices recognise and account for the risks posed by these conveyances.</p>	<ul style="list-style-type: none"> • Do not recycle cardboard packaging materials. • Store unused boxes and bins on clean hard floors in a covered area. • Sanitise plastic bins before reuse in the supply chain. • Clean pallets of organic material and soil before use. • Store dirty pallets away from growing areas.
<p>STAFF AND FARM VISITORS</p> <p>Contractors, tourists, news reporters, service providers, family members, and school groups all visit the farm now and again. For many, a farm visit is a valuable and rare experience, however for growers such a visit can prove costly. Insects, nematodes, weed seeds, plant viruses – there are many organisms that can hitchhike on clothing, hands, footwear and vehicles, and they can seriously affect grower bottom lines.</p>	<ul style="list-style-type: none"> • Check visitor clothing, footwear and tools for organic matter and soil. If required, clean down before entering the farm. • Maintain cleaning facilities, including footbaths and brushes, making sure they are accessible for visitors and staff. • Induct staff in on-farm biosecurity practices. • Ensure visitors are aware of biosecurity expectations prior to moving around the farm. • Ensure all visitors report to management, sign a visitor register and report previous movements in other growing regions upon entering the property. • Use gate signs to direct traffic and inform visitors about property access points. • Ensure there is a clearly designated parking area for visitors to minimise interaction with growing areas and farm equipment • Maintain regular communication with neighbours regarding biosecurity procedures.

TRANSMISSION PATHWAY	ACTIONS TO REDUCE TRANSMISSION
<p>WASTE AND WEEDS</p> <p>Plant waste and weeds can be effective incubators of plant pests. Cucumber green mottle mosaic virus and Potato spindle tuber viroid are examples of pests that can 'hide' in organic waste or surrounding weeds when primary hosts are not available.</p>	<ul style="list-style-type: none"> • Store waste away from growing areas and water sources. • Dispose of waste as soon as possible. This can be done by burial, burning or composting. • Maintain weed-free buffer zones around growing areas. • Control weed populations in order to prevent incubation and transmission of plant pests, diseases and weeds.
<p>PLANTING MATERIALS</p> <p>Fertiliser, compost, plastic mulch, seedlings, seed and seed potato, as well as other planting materials, can incubate plant pests and diseases. Plant viruses and some bacterium are particularly good at incubating in seed. Often, this is how plant pests achieve long range transmission between countries.</p>	<ul style="list-style-type: none"> • Source planting material from reputable suppliers. • Treat for pests as required. • Follow seed testing requirements for imported seed as listed in BICON – Australian Biosecurity Import Conditions Database. • Arrange testing of seed if necessary. • Keep any tests for plant pests (seed diagnostics) on record.
<p>WIND</p> <p>Routine checking of crops is an important aspect of maintaining crop health and gives you the best chance of identifying a new pest before it becomes established. Vegetable leafminer, the Lettuce aphid and the Tomato potato psyllid are examples of pests that can be carried into Australia or new regions via wind.</p>	<ul style="list-style-type: none"> • Carry out regular pest surveillance in crops and surrounding vegetation. • Train staff to be aware of common and exotic plant pests. • Make posters, information pages and fact sheets available on property to help staff identify symptoms. • Use traps to survey for insects. • Record the date of all observations, such as pests identified, growing area affected, the level of infestation and proposed treatment plans. • In the interests of aiding market access, pest surveillance should also include documenting <u>lack of observation</u> for trade sensitive pests (eg. QFly).



FARM BIOSECURITY ACTION PLAN FOR MANAGEMENT OF VEGETABLE AND POTATO PLANT PESTS

This Action Plan is a template with which you can address the pest transmission pathways listed in this booklet. It is designed so that you can put your individual management action in the blank column. It is recommended that the Action Plan is completed before the Farm Biosecurity Checklist to demonstrate that actions are being implemented. Prioritise biosecurity actions for each growing area on your property. Update your biosecurity plan as goals are achieved and integrate biosecurity actions into your overall Farm Management Plan.

WHAT IS THE RISK?	ESTIMATED RISK RATING* 0 = no risk, 10 = high risk	CURRENT MEASURES IN PLACE	ADDITIONAL MEASURES
VEHICLE MOVEMENT With multiple entry sites, vehicle access cannot be controlled, making it difficult to stop visitors moving into growing regions. These risks are increased when the vehicles have been exposed to different growing areas.			
VEHICLE AND EQUIPMENT HYGIENE Areas where organic matter can become lodged, such as tyre treads and grilles, can incubate plant pests.			
STAFF AND FARM VISITORS Visitors and staff can carry plant pests between production areas. Staff that are untrained in good biosecurity practices can spread diseases, pests and degrade biosecurity protocols that are in place. It can be difficult to trace the source of a pest outbreak without knowledge of who has visited the farm.			
WASTE Farm waste can become a breeding ground and incubation source for plant pests.			

PLANTING AND PACKAGING MATERIALS Seed, seedlings, packaging materials, soil, compost and fertiliser can be a source of plant pests.			
PEST SURVEILLANCE Lack of surveillance can lead to pest infestation symptoms going unnoticed, allowing the pest to go unmanaged, during which time they may establish in growing regions and spread to other properties.			
GROWING AREA REGULATION Unnecessary people, vehicles and equipment movement in growing areas can increase the risk of plant pest transmission. Neighbouring properties could harbour plant pests. Weeds can be an incubation source for pests. Feral animals have the potential to spread pests.			
BIOSECURITY PLANNING Not implementing biosecurity strategies and increasing biosecurity can increase the risk of plant pest infestation, lead to higher long-term costs for managing plant pests, and place market access at risk.			
EXTRA RISK			
EXTRA RISK			

*The risk rating is a qualitative estimate that aims to indicate high priority areas of farm biosecurity. It is important to note that individual properties may face different levels of risk for each aspect of biosecurity. For this reason farm biosecurity plans should be tailored accordingly to be most effective. Attributing a value to the risk rating should be based on current knowledge of farm traffic, farm management practices, and professional advice.



FARM BIOSECURITY CHECKLIST

This checklist is intended as a resource for growers implementing biosecurity best practice to reduce the risk of plant pest transmission. The checklist should be used in conjunction with the Biosecurity Action Plan.

BIOSECURITY PRACTICE	IN PLACE	IN PROGRESS	NOT PRACTICED	N/A
VEHICLE CLEANING				
Wash-down facilities are provided on site for machinery, equipment and vehicles				
Run-off from wash down facilities is collected in a tank for disposal or drains into a special pit as used for spray tank runoff				
Clean down facilities are located near farm entrances and away from growing areas				
A hard surface is provided in vehicle wash down area				
High pressure water and air hoses are available for removal of plant and soil from machinery, equipment and vehicles				
Wash-down facility and surrounds are inspected frequently for potential sources of contamination (eg. organic matter)				
Records of wash down facility inspections are logged				
Machinery is inspected and disinfected before entering growing areas				
VEHICLE MOVEMENT				
Visitor vehicle access is restricted to designated parking areas				
Only on-site vehicles are used to transport equipment and visitors around the farm				
Vehicle movement is kept to a minimum in growing areas				
Designated tracks are used to limit vehicle movement on growing areas				
Machinery and vehicles are cleaned before moving off property				
STAFF AND FARM VISITORS				
Footbaths and scrubbing brushes are easily accessible for staff and farm visitors				
Visitor clothing, footwear and tools are checked for soil and organic matter before entering the farm				
Staff is trained in biosecurity and farm hygiene practices				
Visitors are inducted in biosecurity expectations prior to moving around the farm				
Visitors sign a register in order to monitor on-farm movements				
Appropriate hygiene supplies are available to staff and visitors (hand sanitiser, gloves, boots, overalls)				
Contractor entry is conditional to a biosecurity induction and hygiene protocols				

GROWING AREAS AND CONTROLLED ACCESS

Biosecurity gate signs requesting phone check-in and providing owner/manager contact numbers are visible at main entrances				
Farm is divided into 'zones' with restricted or minimised people, machinery and equipment movement between zones				
A sanitation procedure is in place where there is regular movement of people, machinery or equipment between zones				
There is regular communication with neighbours and government agencies regarding minimising plant pest transmission				
Boundary fences are regularly inspected and maintained				
Weed populations are managed in line with regulations to prevent the spread of plant pests and pest incubation				
Plant waste is disposed of away from growing areas				

SOURCING OF PLANTS AND MATERIALS

Records of planting inputs are maintained				
Planting material for all crops grown are sourced from reputable suppliers				
Imported seed has been tested as per BICON conditions if applicable				
Records of seed or seedling tests are logged				
New seedlings are quarantined from growing areas for a period of time before planting				

PEST SURVEILLANCE

Symptom monitoring is regularly conducted in crops				
Symptom monitoring is regularly conducted in neighbouring vegetation				
Staff is trained to recognise symptoms of pest damage/infection				
Staff know how and where to report suspect plant disease symptoms				
Activities and results of pest surveillance are recorded, including lack of observations				
Monitoring records are well organised and maintained				
A farm management plan is maintained for endemic pests				
Traps are used to maintain insect populations				

PACKAGING AND PALLETS

Cardboard packaging materials are new and never recycled				
Unused boxes and bins are stored on clean hard floors in a covered area				
Pallets are clean of organic material and soil				
Dirty pallets are cleaned in the wash down area				



CHEMICAL TREATMENTS FOR DISINFECTION ON SURFACES AND EQUIPMENT

ACTIVE INGREDIENTS*	EFFECTIVE AGAINST	RECOMMENDED PREPARATION*
Chlorine e.g. Sodium hypochlorite	Bacteria, viruses and fungi	Sodium hypochlorite – 10 ml (1%) Potable water – 1 litre Contact time – 10 minutes
Pentapotassium bis (peroxymonosulphate) 40-50%, Sodium C10-13-alkylbenzenesulfonate 10-12% Malic Acid 7-10% Sulphamidic acid 4-6% e.g. Virkon S	Bacteria, viruses and fungi	Virkon – 10 g Water – 1 litre Contact time – 10 minutes
Benzalkonium chloride 54g/L, Polyhexamethylene Biguanide Hydrochloride 4g/L e.g. F10SC	Bacteria, viruses and fungi	F10SC – 4 ml Water – 1 litre Contact time – 10 minutes

* Handle with care according to chemical safety data sheet.

** When disinfecting equipment or machinery surfaces please allow 10 minutes of contact to ensure that surfaces are disinfected properly. For footbaths, be sure that chemicals cover the entire tread of the shoe for 5-10 seconds.



Portable biosecurity kit and footbath




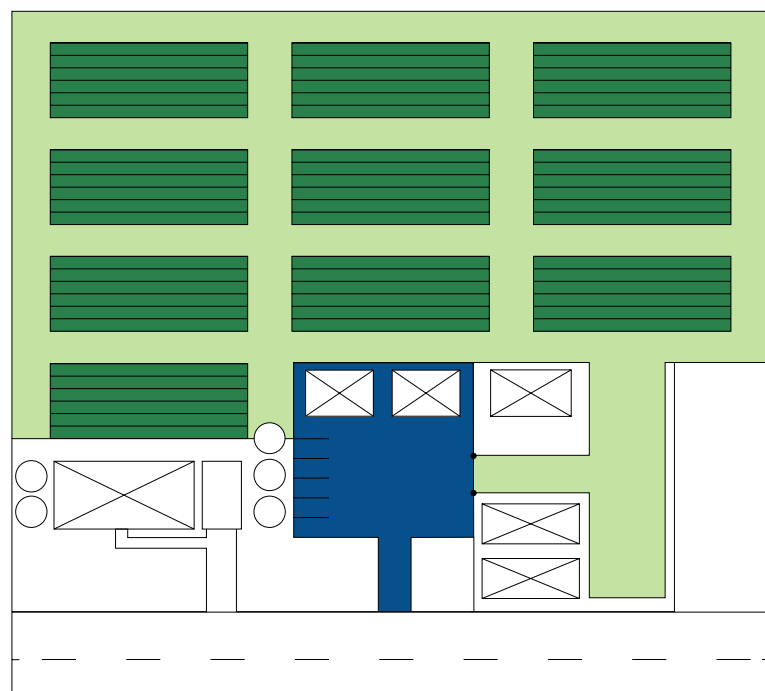
ZONING: KEEP YOUR DIRT ON YOUR FARM

Zoning of property is a cost-effective way to minimise the risk of spreading pests and disease on-farm. Furthermore, when quarantine measures are instituted there is potential to claim partial property freedom whereby, zoned properties will only have infected areas shut down while pest-free zones are allowed to maintain normal operation. Implementing zoning procedures can lead to major benefits to farmers and reduce the financial impact of quarantine.

Zoning divides farms into distinct areas: exclusion, separation, and farming. The exclusion zone restricts non-essential visitor and staff vehicles to specified car parking at the farm entrance. Separation includes the roadways and pathways for essential vehicles to access different areas on-farm. Lastly, farming areas are where farm vehicles, machinery and equipment operate on the property. Zones should be marked by physical barriers such as fencing and signage indicating locations of footbaths, clean-down facilities, drainage, roads and access points for delivery and collection. Movement should be restricted between zones where possible.

LEGEND

-  Exclusion
-  Separation
-  Farming





HIGH PRIORITY PESTS

ZEBRA CHIP

CANDIDATUS LIBERIBACTER SOLANAGERUM

Solanaceae

Symptoms:

Stunting, chlorosis and swollen nodes; leaf scorching; shortening or collapsed stolons; tubers tend to be smaller and misshapen; striped patterns appear in fried cross sections of potato tubers.



TOMATO-POTATO PSYLLID BACTERICERA COCKERELLI

Wide host range
(*Solanaceae* preferred)

Symptoms:

Severe wilting; yellowing of leaf margins and upward curling of leaves; plants appearing dirty and/or sticky; shortening of stem internodes; and stem death.



POTATO CYST NEMATODE (PALE) GLOBODERA PALLIDA

Roots of *Solanaceae*

Symptoms:

Infested plants exhibit wilting and stunted growth; leaves may appear yellow or display a dull colour; at flower or later, minute white, yellow, or brown spheres or cysts can be seen on the outside of roots.



BROWN MARMORATED STINK BUG HALYOMORPHA HALYS

Wide host range

Symptoms:

Small necrotic spotting on fruit and leaf surfaces.



AMERICAN SERPENTINE LEAFMINER *LIRIDOMYZA TRIFOLII*

Wide host range

Symptoms:

Stippled foliage (as upper leaf cells are destroyed), white or greenish-white mines (lines) and blotches on leaves indicate the presence of leafminers. Fungal infection may also occur, as the feeding damage increases susceptibility to secondary infections. *L. trifolii* and *L. sativae* adults are similar in appearance.



VEGETABLE LEAFMINER *LIRIDOMYZA SATIVAE*

Wide host range

Symptoms:

Small brown puncture wounds present on leaves; larvae feeding causes mines in leaf tissues; plants typically lose vigour and can potentially die.



MELON FRUIT FLY *BACTROCERA CUCURBITAE*

Cucurbitaceae fabaceae

Symptoms:

Small discoloured patches on skin; premature falling and rot of fruit; larvae feeding on cucurbit flowers and stems.



CARROT (RUST) FLY *PSILA ROSAE*

Apiaceae (mainly carrot)

Symptoms:

Tap root damage leaving gaps in the crop; irregular brown channels under the surface of the tap root and lower down; leaves appear reddish and plants may die.



IMAGE REFERENCES

(In order of appearance)

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Northern Australian Quarantine Strategy (NAQS)

Whitney Cranshaw, Colorado State University, Bugwood.org

Scott Bauer, USDA Agricultural Research Service, Bugwood.org

Ken GrayInsect Image Collection

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