

Methyl bromide fumigation methodology

Version 3.x



International Cargo Cooperative Biosecurity Arrangement

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

Purpose

The purpose of this methodology is to assist national plant protection organisations (NPPO), and others, to increase clarity and consistency in the use and understanding of the application of methyl bromide for quarantine purposes.

已註解 [BM1]: NZ amendment

This methodology sets out the minimum requirements for treatment providers performing methyl bromide fumigations on commodities and/or associated packaging suited to such treatments for Quarantine and Pre-shipment (QPS) purposes. This methodology is the basis for compliance auditing of treatment providers to monitor their performance of effective QPS treatments with methyl bromide. Companies undertaking methyl bromide fumigations on import and export consignments for Quarantine and Pre-shipment (QPS) purposes are required to be approved by the relevant NPPO (ISPM 43).

已註解 [BM2]: NZ Amendment

Importing countries have the right to impose more stringent treatment conditions to address their individual biosecurity risks. In such cases, those additional conditions take precedence over the requirements of this methodology and must be complied with to the satisfaction of the relevant authority of the importing country.

Fumigation treatment providers registering to perform treatments in accordance with these requirements must have the equipment, facilities, accredited fumigators and management and administrative procedures necessary to ensure that all relevant treatments comply with these requirements.

Countries receiving treatment certification through this system expect the treatment has been undertaken in accordance with this methodology. Treatment providers found to be wilfully and consistently not complying with the requirements of this methodology and/or other specified treatment conditions will have their registration status changed to 'unacceptable' until they can demonstrate satisfactory compliance.

Methyl bromide is listed as a category 1 ozone depleting substance under the Montreal Protocol 1992. It can only be used for official QPS treatments. NPPOs are advised to use the IPPC recommendation on the replacement of or reduction in the use of methyl bromide as a phytosanitary measure in order to reduce emissions of methyl bromide. Replacement or reduction of the use of methyl bromide as a phytosanitary measure. Performing methyl bromide fumigations in accordance with these requirements will reduce the use of methyl bromide by minimising the need for re-treatment of consignments due to ineffective fumigations caused by poor fumigation practices¹.

已註解 [BM3]: NZ amendment

Scope

This reference standard is an agreed methodology for the application of methyl bromide to be followed as part of a quarantine regulators treatment program. It has been developed to

¹ [Replacement or reduction of the use of methyl bromide as a phytosanitary measure](#)

provide a harmonized treatment methodology amongst ICCBA Members participating in the ICCBA Methyl Bromide Schedule.

This document applies to commercial and government treatment providers performing QPS methyl bromide fumigation treatments.

This document is not intended to specifically cover the performance of methyl bromide fumigation treatments under ISPM 15. However, the basic principles, requirements and recommendations described in this document and the associated guideline are still generally applicable.

Even though the basic principles and requirements would be relevant this document is not intended to specifically cover fumigations of vessels (whether it is the vessel itself or its cargo) silos or other storage facilities, buildings or other fumigations that are not done in the types of enclosure described herein and not related to import or export.

How to use this document

This document outlines the minimum set of requirements for performing methyl bromide fumigation treatments.

The [Guide to performing QPS fumigations with methyl bromide](#) and [Guide to packaging suitability for performing QPS treatments](#) provide information that may assist in meeting these requirements in commonly encountered situations.

It is important treatment providers and compliance auditors understand the purpose of the requirements of this methodology, the outcomes they are intended to achieve and the circumstances in which they apply.

The technical terms used in this methodology are defined in the glossary. For all terms not defined in the glossary, refer to the definition used by the [Macquarie Dictionary](#).

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1 Fumigator ~~capability~~ readiness

1

Note: Prior to fumigation the fumigator must ensure they have trained personnel, suitable equipment, and suitable site to conduct fumigations.

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已註解 [BM4]: Amendment from Australia in response to #12

格式化: 字型: (中文) + 本文 (Calibri)

1.1 Fumigation personnel

- 1.1.1 The fumigator-in-charge must ensure the requirements of this methodology are complied with.
- 1.1.2 The fumigator-in-charge must comply with the treatment schedule, as set by the relevant authority, for the goods being treated.

1.2 Fumigation equipment

- 1.2.1 The equipment used for performing a fumigation must be fit for purpose and in good working order.
- 1.2.2 Electronic instruments used to measure temperature, methyl bromide concentration or to detect the presence of methyl bromide, must be calibrated and serviced in accordance with the manufacturer's instructions. If the manufacturer's instructions are silent on calibration frequency, equipment must be calibrated every 12 months.
- 1.2.3 Gas concentration measuring instruments must be fitted with any filters as specified by the manufacturer to suit the circumstances of the fumigation.
- 1.2.4 Equipment must be used in accordance with the manufacturer's instruction manual.
- 1.2.5 Temperature monitoring instruments must be accurate to within +/-1°C.

1.3 Site suitability

- 1.3.1 The fumigation site must:

- a) have adequate space to establish an exclusion zone around the enclosure in accordance with section [5.1 Establish an exclusion zone](#); and
- b) allow for safe ventilation; and
- c) be on a flat and even surface; and
- d) be well ventilated; and
- e) have power available, either via mains or a generator.

2 Safety

Note: Local jurisdictions may have safety legislation and regulations that govern the safe performance of a fumigation. The requirements contained in Section 2 may differ from the local laws, the fumigator-in-charge must comply with the laws relevant to where the fumigation is being performed.

2.1 Safety considerations

- 2.1.1 If a fumigation is performed in a jurisdiction that does not have legislation or local regulations for the safe performance of a fumigation section [2 Safety](#) applies.
- 2.1.2 Methyl bromide must be handled in a manner consistent with instructions on the product label, safety data sheet or relevant licence requirements.

2.2 Risk assessment

- 2.2.1 Before commencing fumigation, a risk assessment must be carried out to identify the risk of methyl bromide exposure to:
 - a) fumigation personnel; and
 - b) people in the vicinity; and
 - c) occupants of surrounding buildings.
- 2.2.2 Before commencing fumigation, safety measures must be put in place to address all the risks identified in the risk assessment. These safety measures must minimise the risk of methyl bromide exposure to:
 - a) fumigation personnel; and
 - b) people in the vicinity; and
 - c) occupants of surrounding buildings.

2.3 Personal protective equipment (PPE)

- 2.3.1 Respiratory protection equipment must be worn, at all times, by any person inside the exclusion zone, including during ventilation.
- 2.3.2 Full-face respirators must be:

- a) operated in accordance with the manufacturer's instructions; and
- b) fitted with a gas filter canister suitable for use with methyl bromide and replaced in accordance with the manufacturer's instructions; and
- c) maintained in accordance with the manufacturer's instructions, with all valves clean and intact; and
- d) able to form an airtight seal against the face of the fumigator.

2.3.3 Self-contained breathing apparatus must be:

- a) operated in accordance with the manufacturer's instructions; and
- b) used only by properly trained personnel; and
- c) maintained in good working order and in accordance with the manufacturer's instructions.

3 Consignment suitability

3.1 Target of fumigation

Note: The fumigator-in-charge must determine if the consignment and target of fumigation is suitable for fumigation with methyl bromide. To be considered suitable, consignments must meet the requirements of section [3 Consignment suitability](#).

- 3.1.1 The fumigator must record the target of fumigation on the record of fumigation (see section [12 Documentation](#)).
- 3.1.2 If the consignment is not suitable for fumigation, remedial action must be taken to make the consignment suitable prior to fumigation. If the consignment cannot be made suitable, the consignment must not be fumigated with methyl bromide.
- 3.1.3 If the target of fumigation includes the exterior of a sea container, the fumigation must be performed as a sheeted enclosure in accordance with section [4.2 Sheeted enclosures](#) or otherwise made suitable for fumigation.

3.2 Impermeable packaging, wrappings and surface coatings

- 3.2.1 The target of fumigation must not be covered by impermeable packaging, wrapping or surface coatings that impede methyl bromide distribution.
- 3.2.2 Impermeable packaging and wrappings that impede methyl bromide distribution or impede methyl bromide penetration into the target of fumigation must be removed, opened, slashed or made pervious prior to fumigation in accordance with the specifications set out at 3.2.3 and 3.2.4.
- 3.2.3 To be considered pervious, wrappings must have at least:

- a) 4 holes of 6 mm diameter per 100 mm x 100 mm surface area, or
- b) 5 holes of 5 mm diameter per 100 mm x 100 mm surface area, or
- c) 6 pinholes per 10 mm x 10 mm surface area.

3.2.4 Pervious wrappings must be in a single layer, so the perforations are not blocked by the wrapping overlapping itself.

3.2.5 If penetration into the target of fumigation is required, the target of fumigation must not be coated in materials that may impede penetration of methyl bromide into the target of fumigation (for example: lacquers, paints, waxes, natural oils, veneers or plastic wraps).

[3.2.6 All packaging material associated with consignments must be fumigated in accordance with the treatment schedule specific to the consignment.](#)

← 格式化: 縮排: 左: 1.7 公分, 取消項目符號與編號

已註解 [BM5]: Moved under 3.3 - in response to comment #18

3.3 Requirements for perishable commodity packaging

3.3.1 Section 3.3 requirements apply to perishable commodities.

Note: If the target of fumigation is in impermeable packaging, the impermeable packaging must be removed, opened or made pervious in accordance with section [3.2 Impermeable packaging, wrappings and surface coatings](#) prior to fumigation.

3.3.2 Cartons must have holes that allow methyl bromide to distribute into the cartons and reach the target of fumigation. Holes may be covered with insect-proof mesh.

3.3.3 If cartons do not have holes, then prior to fumigation all cartons must:

- a) be opened or have lids removed, or
- b) have holes created in the cartons that allow distribution of methyl bromide into the cartons and reach the target of fumigation.

[3.3.4](#) Cartons must be arranged in a way that does not block holes or impede methyl bromide distribution.

[3.3.43.3.5 All packaging material associated with consignments must be fumigated in accordance with the treatment schedule specific to the consignment.](#)

3.4 Load factor requirements for perishable commodity fumigations

3.4.1 Section 3.4 requirements apply to perishable commodities.

3.4.2 If the target of the fumigation is a perishable commodity, and the treatment schedule does not specify load factor requirements, the following load factor requirements apply:

- a) A maximum load factor of 80%.
- b) Packages must be placed on pallets or raised off the ground by at least 100 mm by other means.

3.5 Requirements for timber

3.5.1 Section 3.5 requirements apply to timber and timber products.

Note: If the target of fumigation is timber, the methyl bromide must be able to penetrate every part of the timber. The accepted depth that methyl bromide can penetrate into timber is 100 mm from the surface of the timber.

- 3.5.2 If the target of the fumigation is uncoated timber, all internal points within the timber must be no greater than 100 mm from a surface of the timber.
- 3.5.3 If the target of fumigation is timber coated with an impermeable material the timber must:
 - a) have one uncoated surface no more than 100 mm from the coated surface, or
 - b) be fumigated before any impermeable surface coatings are applied.
- 3.5.4 Individual timber products must be separated by a minimum of 5 mm every 200 mm to create space for fumigant penetration along the entire length of the timber. This separation can be horizontal or vertical.

4 Fumigation enclosures

4.1 All enclosures

- 4.1.1 All fumigation enclosures must be:
 - a) sufficiently gas-tight to retain the methyl bromide for the duration of the exposure period; and
 - b) prepared to safely inject and ventilate methyl bromide; and
 - c) sealed to minimise methyl bromide escape; and
 - d) prepared to ensure even methyl bromide distribution throughout the enclosure; and
 - e) monitored for temperature if applicable.
- 4.1.2 Each individual enclosure is a separate fumigation and must be recorded on its own record of fumigation.

4.2 Sheeted enclosures

- 4.2.1 Section 4.2 requirements apply to sheeted enclosures.
- 4.2.2 Surfaces on which sheeted enclosures are constructed must be impermeable to methyl bromide or covered with a gas-proof sheet to make it impermeable.
- 4.2.3 Fumigation sheets must be weighed down to seal it against the surface and hold it securely in place. The seal must be:

- a) created using materials that can follow the contour of the surface; and
- b) arranged so there are no gaps or breaks in the seal around the entire enclosure.

4.2.4 All sea containers fumigated in a sheeted enclosure must have at least one door **fully** open during the fumigation.

4.2.5 If multiple sea containers are fumigated in a sheeted enclosure the fumigation must be monitored in accordance with section [5.3 Gas concentration monitoring locations](#).

已註解 [BM6]: Added in response to comment #22

4.3 Fumigation chambers

4.3.1 Section 4.3 requirements apply to fumigation chambers.

4.3.2 A fumigation chamber must:

- a) be permanently sealed along all joins between the walls, ceiling and floor; and
- b) be gas-tight once the door is closed without the need to use tape, sealant, sand snakes or any other means; and
- c) not have anything, such as concentration sampling tubes, supply pipes or electrical leads, enter the chamber that will interfere with the seal; and
- d) have an inbuilt extraction system that actively removes methyl bromide from the enclosure; and
- e) pass a pressure test at least every six months in accordance with section [4.4 Pressure testing a fumigation chamber](#).

4.4 Pressure testing a fumigation chamber

4.4.1 Pressure testing must be performed with all concentration sampling tubes, supply pipes and electrical leads in place as they would be for fumigation.

4.4.2 To perform a pressure test, the pressure within the enclosure must be raised by 250 pascals (Pa) relative to atmospheric pressure. To pass the pressure test, it must take 10 seconds or more for the pressure in the enclosure to fall from 200 Pa to 100 Pa relative to atmospheric pressure.

4.4.3 If the pressure falls from 200 Pa to 100 Pa in less than 10 seconds, the enclosure has not passed the pressure test and an exclusion zone must be maintained throughout the exposure period in accordance with section [5.1 Establish an exclusion zone](#).

4.4.4 A record of the pressure test must be completed for every pressure test and kept for a minimum of two years.

4.4.5 All following information must be recorded on a record of pressure test:

- a) Location – the site address where the pressure test was performed.
- b) Chamber identification details.
- c) Time and date the pressure test was performed.
- d) The name and signature of the person who performed the pressure test.
- e) The time taken for the pressure in the enclosure to fall from 200 Pa to 100 Pa.

4.4.6 A record of pressure test must be completed accurately.

4.5 Vacuum chamber

- 4.5.1 Section 4.5 requirements apply to vacuum chambers.
- 4.5.2 A vacuum chamber must be capable of attaining an initial vacuum of at least 660 mmHg, equivalent to 88 kPa.
- 4.5.3 Once methyl bromide has been injected, the resulting vacuum pressure must be maintained without further extraction of gas from the chamber for the duration of the exposure period.
- 4.5.4 The exposure period for fumigations performed in a vacuum chamber starts at the completion of methyl bromide injection into the chamber.

4.5.5 ~~Gas concentration monitoring is not required for vacuum chamber fumigations.~~

已註解 [BM7]: Removed in response to comment #23

4.5.5 ~~Temperature and pressure must be monitored for the duration of the treatment.~~

已註解 [BM8]: Added in response to comment from Indonesia 24/04/2024

5 Preparing to fumigate

5.1 Establish an exclusion zone

Note: Local jurisdictions may have safety legislation and regulations that govern the safe performance of a fumigation. The requirements contained in Section 5.1 may differ from the local laws, the fumigator-in-charge must comply with the laws relevant to where the fumigation is being performed.

已註解 [BM9]: Added in response to comment #25

5.1

格式化: 內文, 段落遺留字串控制

- 5.1.1 An exclusion zone must be established around the fumigation enclosure and equipment used for methyl bromide injection.
- 5.1.2 The exclusion zone must have a physical barrier at all points where the enclosure is accessible.
- 5.1.3 The exclusion zone barrier must be in place when the exclusion zone is in force.
- 5.1.4 The exclusion zone barrier must have warning signs that:
 - a) are visible from all angles of approach; and
 - b) display symbols indicating danger and/or toxic gas is in use; and
 - c) are in a language spoken by staff at the fumigation site.
- 5.1.5 The size of the exclusion zone must not be less than:

- a) 3 metres from the enclosure, if the enclosure is located outdoors, or
- b) 6 metres from the enclosure, if the enclosure is located inside a building or structure.

- 5.1.6 The exclusion zone must be in force from immediately prior to methyl bromide injection and until the enclosure has been ventilated and the methyl bromide concentration is verified at or below the threshold limit value (TLV) in accordance with section [11 Ventilating the fumigation enclosure](#).
- 5.1.7 If the enclosure is a fumigation chamber, compliant with section [4.3 Fumigation chambers](#), or a vacuum chamber, compliant with section [4.5 Vacuum chamber](#), the exclusion zone may be removed once the methyl bromide has been injected and the doors are locked.
- 5.1.8 If the exclusion zone is removed in accordance with requirement 5.1.7, the exclusion zone must be re-established prior to ventilation and remain in-place until the methyl bromide concentration is verified at or below the TLV in accordance with section [11 Ventilating the fumigation enclosure](#).

5.2 Gas concentration monitoring equipment

- 5.2.1 All gas concentration monitoring equipment must be able to detect methyl bromide concentrations within the treatment dose range for the goods treated and be in good working order.
- 5.2.2 Gas concentration monitoring instrument must be operated, calibrated and serviced according to the manufacturer's instructions.
- 5.2.3 If using concentration sampling tubes that extend outside the enclosure, each concentration sampling tube must:
- a) be clearly identified according to their location within the enclosure; and
 - b) be free from kinks and blockages; and
 - c) be of a diameter suitable to fit the inlet of the concentration measuring instrument.
- 5.2.4 If gas concentration monitoring instruments are placed within the enclosure each instrument must:
- a) allow for readings to be read outside of the exclusion zone; and
 - b) be clearly identified according to their location within the enclosure.

5.3 Gas concentration monitoring locations

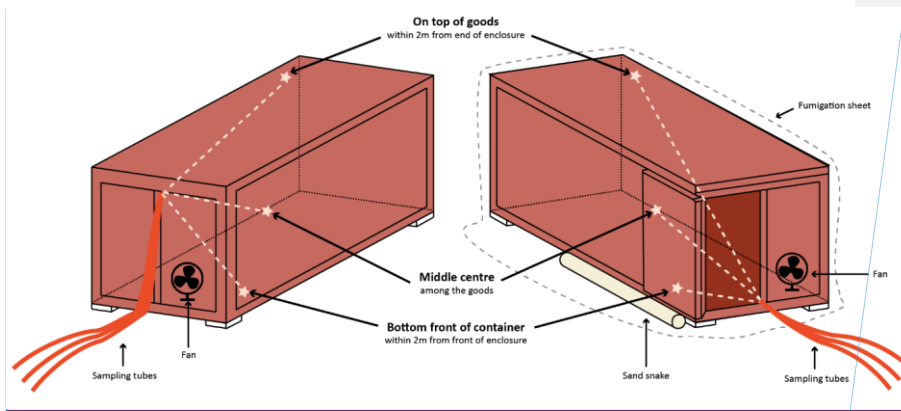
Note: Section 5.3 does not apply to perishable commodities. See section [5.4](#) for gas concentration location requirements for perishable commodities.

- 5.3.1 Enclosures less than 30 m³ in volume must have at least one gas concentration monitoring location. The monitoring location must be on the top, centre of the goods.

5.3.2 Enclosures ~~equal to or larger-greater than in volume than~~ 30 m³ ~~in volume~~ must have at least three gas concentration monitoring locations. The monitoring locations must be:

- a) on top of the goods within 2 metres of the end of the enclosure; and
- b) no more than 250 mm above the floor of the enclosure and within 2 metres of the opposite end from the top gas concentration monitoring location; and
- c) in the middle centre of the enclosure among the goods and at least 2 metres from the other gas concentration monitoring locations.

Figure 1 Single sea container enclosure monitoring locations



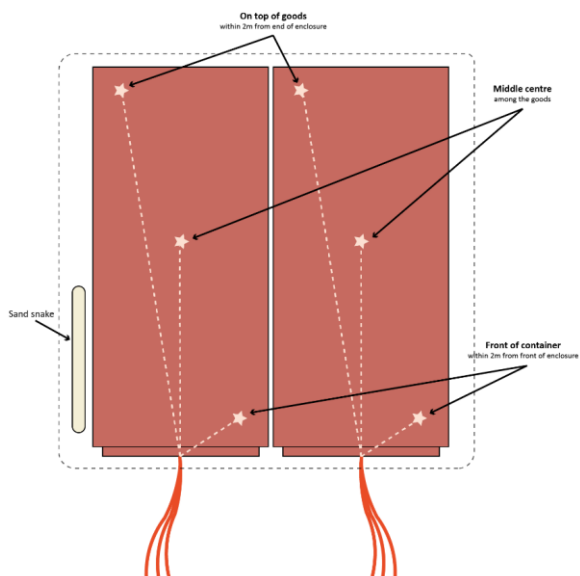
5.3.3 If a sheeted enclosure contains multiple sea containers, each sea container must have at least three gas concentration monitoring locations in accordance with requirement 5.3.2.

已註解 [BM10]: Fixed - comment #29

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已註解 [BM11]: Images retained/updated - comment #30

Figure 2 More than one sea container sheeted enclosure monitoring locations



5.3.3

5.3.4 Additional gas concentration monitoring locations must be used if mandated by import conditions. The concentration readings from these additional monitoring locations must be recorded on the record of fumigation.

5.4 Gas concentration monitoring locations – perishable commodities

5.4.1 Section 5.4 requirements apply to perishable commodity fumigations.

5.4.2 If there is one type of commodity and packaging, and the total enclosure volume is less than 5 m³ the gas concentration must be monitored in at least one location. The gas concentration monitoring location must be inside a carton:

- a) in the centre of the stack, or
- b) in the middle of the enclosure, if the cartons are not stacked.

5.4.3 If the enclosure is equal to or greater than 5 m³ in volume the gas concentration must be monitored in at least three locations. The gas concentration monitoring locations must be inside a carton:

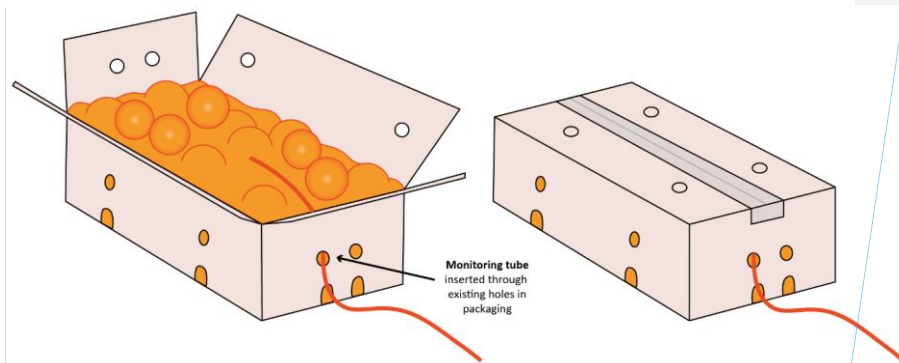
- a) at the top of a stack at within 2 meters of the end of the enclosure; and
- b) no more than 250 mm above the floor of the enclosure and within 2 metres of the opposite end from the top gas concentration monitoring location, and
- c) in the middle centre of the enclosure halfway up a stack.

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已註解 [BM12]: Fixed - Comment #36

- 5.4.4 If the target of fumigation is packaged inside one or more layers of packaging, the gas concentration monitoring locations must be located inside the packaging next to the target of fumigation.

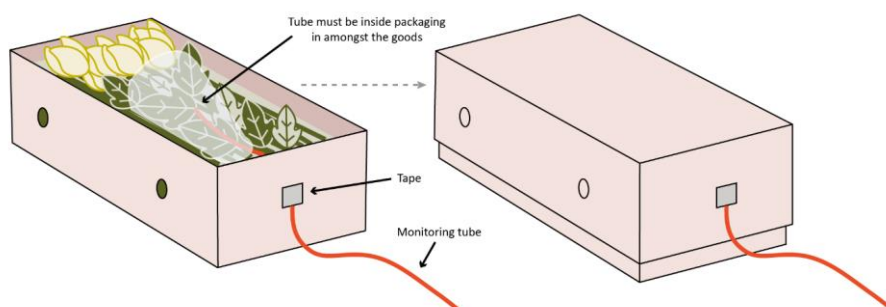
Figure 3 Monitoring tube in a perishable fruit package



5.4.4

- 5.4.5 If the target of fumigation is cut flowers, leaf, stem material or bulbs imported as nursery stock, the gas concentration monitoring location must be located within the bunch in the middle of a carton.

Figure 4 Monitoring tube in a package of cut flowers



5.4.5

- 5.4.6 The placement and installation of gas concentration monitoring equipment within cartons or packaging must not change the gas penetration properties of the carton or package.
- 5.4.7 If there are different types of packaging in the consignment, there must be one gas concentration monitoring location inside each of the different packaging types. The minimum number of monitoring locations and position of the monitoring locations must be in accordance with section 5.4.3. If there are more than three different types of packaging, the number of gas monitoring locations must be the same as the number of different packaging types.
- 5.4.8 Additional concentration monitoring locations must be used if mandated by import conditions. The concentration readings from these additional monitoring locations must be recorded on the record of fumigation.

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已註解 [BM13]: Images added - Comment #36-37

格式化: 標號, 段落遺留字串控制

已註解 [BM14]: Added Indonesia - Comment #37

5.5 Temperature monitoring instrument locations

- 5.5.1 Section 5.5 requirements apply to perishable commodity fumigations and controlled temperature fumigations.
- 5.5.2 The temperature of the enclosure must be monitored with a digital thermometer in at least one location within the enclosure.
- 5.5.3 If heaters are used, the temperature monitoring instruments must be placed within the enclosure as far away as practical from the heat source.
- 5.5.4 Temperature monitoring instruments must:
 - a) allow for readings to be read outside of the exclusion zone; and
 - b) be identified.

5.6 Methyl bromide supply pipes

- 5.6.1 If a sheeted enclosure contains multiple sea containers, at least one supply pipe must be placed in each sea container.
- 5.6.2 For sheeted enclosure fumigations, the supply pipes must be left in position for the duration of the exposure period.
- 5.6.3 Supply pipes left in place must be sealed once the methyl bromide has been injected.

5.7 Heaters and fans

- 5.7.1 If fans are used to circulate the gas, Enclosures must have at least one fan for each 100 m³ of volume or part thereof.
- 5.7.2 Multiple sea containers fumigated in a single enclosure must have at least one fan placed in each container.
- 5.7.3 If heaters are used, they must be positioned in such a way to raise and maintain the air temperature throughout the entire enclosure above the treatment temperature used for the dose calculation.

已註解 [BM15]: Amended to allow for high pressure injection

6 Temperature used to calculate the dose

6.1 Ambient temperature fumigations

- 6.1.1 Section 6.1 requirements apply to ambient temperature fumigations.
- 6.1.2 A weather forecast for the location closest to the fumigation site must be obtained from a verifiable weather source to determine the forecast temperature during the fumigation exposure period.
- 6.1.3 The lowest forecast minimum temperature for the exposure period must be used to calculate the dose as specified in section [8.2 Calculating the dose](#).

- 6.1.4 The forecast minimum temperature must be sourced no earlier than the previous day of the start of exposure period and a record of the source of the information must be retained with the fumigation documentation.
- 6.1.5 The forecast minimum temperature must be recorded on the record of fumigation.

Note: If the ambient temperature is forecast to be 10°C or lower the fumigation cannot be performed as an ambient temperature fumigation. The temperature of the enclosure will need to be raised and maintained meaning the controlled temperature fumigation requirements will apply.

6.2 Controlled temperature fumigations

- 6.2.1 Section 6.2 requirements apply to controlled temperature fumigations.
- 6.2.2 The minimum temperature within the enclosure during the exposure period must be predicted. This predicted temperature must be used to calculate the dose in accordance with section [8.2 Calculating the dose](#).

6.3 Perishable commodity fumigations

- 6.3.1 Section 6.3 requirements apply to perishable commodity fumigations.
- 6.3.2 Dose calculations must be based on the core temperature specified in the treatment schedule.
- 6.3.3 Prior to applying the dose:
- a) the fumigator must measure the core temperature of the goods; and
 - b) the core temperature of the goods must be at or above the temperature specified in the treatment schedule.
- 6.3.4 The minimum number of temperature readings required in 6.3.3 is the same as the number of concentration monitoring locations required in section [5.4 Gas concentration monitoring locations – perishable commodities](#).
- 6.3.5 Temperature readings must be obtained:
- a) from the same positions as the concentration monitoring locations, or
 - b) with at least one temperature reading from each different type of perishable commodity within the enclosure.
- 6.3.6 If the target of fumigation is fruit or vegetables, the pulp temperature must be measured. The temperature measuring instrument must be:
- a) inserted into the centre of the fruit or vegetable, or adjacent to the pit; and
 - b) covering the whole temperature instrument probe (multiple pieces of fruit may be inserted onto the instrument if the fruit is small); and
 - c) placed into the largest sized commodity in mixed consignments; and
 - d) placed in the middle of the carton.
- 6.3.7 If the target of fumigation is cut flowers, leaf, stem material or bulbs imported as nursery stock, temperature readings must be placed within the bunch in the middle of a carton.

- 6.3.8 Dose compensation for temperature variation does not apply to perishable commodities unless specified by the treatment schedule.
- 6.3.9 If the treatment schedule allows dose compensation for temperature variation, the temperature used for dose compensation must be the lowest of:
- a) the temperature of the goods, or
 - b) the expected minimum temperature within the enclosure during the exposure period and compliant with section [6.1 Ambient temperature fumigations](#) or [6.2 Controlled temperature fumigations](#).

7 Temperature during the exposure period

7.1 Ambient temperature fumigations

- 7.1.1 Section 7.1 requirements apply to ambient temperature fumigations.
- 7.1.2 The minimum ambient temperature must be obtained using:
- a) a verifiable weather source, or
 - b) temperature monitoring equipment compliant with section [1.2 Fumigation equipment](#).
- 7.1.3 During the exposure period:
- a) the minimum temperature must be equal to or above the temperature used for dosing, or
 - b) if dose calculations for temperature variation is permitted and the minimum temperature is above 10°C, all concentration readings must be equal to or above the standard concentration requirements in [Appendix 4: Methyl bromide monitoring tables](#) for the minimum temperature obtained.

Note: If the temperature obtained during the exposure period is equal to or below 10°C the fumigation has failed.

7.2 Controlled temperature fumigations

- 7.2.1 Section 7.2 requirements apply to controlled temperature fumigations.
- 7.2.2 The temperature within the enclosure must be monitored with a minimum of one temperature instrument.
- 7.2.3 The temperature within the enclosure must be monitored and recorded at least once every 60 minutes for the entirety of the exposure period. These records must be retained with the fumigation documentation.
- 7.2.4 The temperatures recorded within the enclosure during the exposure period must be equal to or above the temperature used for dosing.

- 7.2.5 The minimum temperature recorded within the enclosure during the exposure period must be recorded on the record of fumigation.

7.3 Perishable commodity fumigations

- 7.3.1 Section 7.3 requirements apply to perishable commodity fumigations.
- 7.3.2 The temperature of the enclosure must be monitored and recorded at least once every 60 minutes for the entirety of the exposure period. These records must be retained with the fumigation documentation.
- 7.3.3 The temperatures recorded during the exposure period, including enclosure temperature and all core/pulp temperatures, must be equal to or above the temperature used for dosing.
- 7.3.4 The minimum temperature of the goods achieved for the exposure period must be recorded on the record of fumigation.

8 Performing the fumigation

8.1 Dose rate compensation for temperature variation

- 8.1.1 If the treatment schedule or import conditions allow dose compensation for temperature variation, and the enclosure temperature is expected to fall below the temperature specified in the treatment schedule, the dose rate may be adjusted to compensate for the lower temperature.
- 8.1.2 If the treatment schedule allows dose compensation for temperature variation, (in accordance with requirement 8.1.1) and the treatment schedule does not specify dose compensation requirements the following calculation must be used: for each 5°C, or part thereof, the temperature is expected to fall below 21°C add 8 g/m³ to the prescribed dose rate.

8.2 Calculating the dose

- 8.2.1 The weight of methyl bromide needed to achieve the prescribed concentration must be calculated by multiplying the dose rate (temperature adjusted in accordance with [section 8.1 Dose rate compensation for temperature variation](#)) by the volume of the enclosure. The formula is:
- Dose (g) = Enclosure Volume (m³) x Dose Rate (g/m³)**
- 8.2.2 If the fumigation is performed as a sheeted enclosure, the external dimensions of the enclosure must be measured prior to each fumigation and used to calculate the enclosure volume.
- 8.2.3 If the fumigation is performed in a fixed-sized enclosure, the internal dimensions of the enclosure must be used to calculate the enclosure volume.
- 8.2.4 If the methyl bromide is mixed with another gas, compensation must be made to the dose amount, so the full amount of methyl bromide required is injected into the enclosure. For methyl bromide supplied with 2% chloropicrin the formula is:

$$\text{Dose (g)} = (\text{Enclosure Volume (m}^3\text{)} \times \text{Dose Rate (g/m}^3\text{)}) \div 0.98$$

- 8.2.5 Once the dose has been calculated, the injected dose must be rounded up to the next increment that can be accurately measured by the equipment used to dispense methyl bromide. If methyl bromide is supplied in cans the dose must be rounded up to the next full can.

8.3 Injecting methyl bromide into the fumigation enclosure

- 8.3.1 A vaporiser must be used when methyl bromide is injected into the enclosure. The vaporiser must maintain a water temperature of at least 65°C while the methyl bromide is being injected to the enclosure.
- 8.3.2 A fan(s) [or alternate way of evenly distributing the gas](#), must be used while injecting methyl bromide into the enclosure.
- 8.3.3 Supply cylinders and the vaporiser must be inside the exclusion zone while methyl bromide is being injected into the enclosure.
- 8.3.4 The time methyl bromide injection was completed must be recorded on the record of fumigation.

8.4 Even methyl bromide distribution

- 8.4.1 The methyl bromide must be evenly distributed throughout the enclosure. This is verified by equilibrium.
- 8.4.2 Equilibrium is achieved when the highest concentration reading is within 15% of the lowest concentration reading.

Note: Equilibrium result is expressed as a percentage and is equal to the highest concentration reading minus the lowest concentration reading, then divided by the lowest concentration reading, then multiplied by 100. The calculation for equilibrium is pictured:

$$\text{Equilibrium \%} = \frac{\text{Highest reading} - \text{Lowest reading}}{\text{Lowest reading}} \times 100$$

- 8.4.3 If the result of this calculation is more than 15%, equilibrium has not been achieved and additional time is needed to allow the methyl bromide to further distribute throughout the enclosure.

Note: Once equilibrium has been achieved it is not required at any other time.

- 8.4.4 Fans used to circulate methyl bromide must be turned off before taking gas concentration readings.

8.5 Exposure period

8.5.1 The fumigation exposure period must not start until:

- a) all concentration readings are equal to or above the retention rate in the treatment schedule or, in the absence of specific retention information, the retention rates in [Table 1](#), and
- b) equilibrium has been achieved in accordance with section [8.4 Even methyl bromide distribution](#).

Table 1 Time of concentration readings after methyl bromide injection and required retention rate of initial dose rate

| Time after methyl bromide injection | Retention rate of initial dose rate concentration |
|-------------------------------------|---|
| 15 to 30 minutes | 85% or more |
| 30 minutes to 1 hour | 75% or more |
| More than 1 hour | 70% or more |

Note: See Appendix 4: Methyl bromide monitoring tables for the retention rates for a range of initial dose rates at different time increments.

8.5.2 Retention rates and standard concentrations must be determined based on actual dose rate applied.

8.5.3 If additional methyl bromide needs to be added before start point has been reached, the amount must be calculated by subtracting the lowest concentration reading from the initial dose rate and multiplying that by the volume of the enclosure.

Additional dose (g) = Enclosure volume (m³) x (Initial dose rate - Lowest concentration reading)

8.5.4 [If additional the methyl bromide needs to be added before start point has been reached and the formulation contains less than 100% methyl bromide, the amount must be calculated in accordance with section 8.2.4.](#)

[8.5.4](#)

8.5.5 If additional methyl bromide is added to the enclosure before the start of the exposure period, the time the injection of additional methyl bromide is completed becomes the new injection time for determining the required start time concentration.

8.5.6 The elapsed time between the start time and the end time of the fumigation must not be less than the exposure period prescribed in the treatment schedule.

8.5.7 After the specified exposure period has elapsed, final concentration readings must be taken from all monitoring locations. The readings and the time they were taken must be recorded on the record of fumigation.

8.5.8 At the end of the exposure period all concentration readings must be equal to or above the concentration in the treatment schedule or, in the absence of specific retention information, the standard concentrations in [Appendix 4: Methyl bromide monitoring tables](#).

已註解 [BM16]: Added Indonesia - Comment #48

格式化: 預設段落字型

格式化: Methyl bromide numbered, 縮排: 左: 0 公分, 段落遺留字串控制

9 Monitoring the fumigation

9.1 Gas concentration monitoring

- 9.1.1 Gas concentration readings must be taken from all gas concentration monitoring locations at the start of the exposure period and at the end of the exposure period.
- 9.1.2 If the exposure period is longer than 24 hours, concentration readings must be taken from all concentration monitoring locations at least every 24 hours in addition to the start and end point readings.
- 9.1.3 All gas concentration readings must be recorded on the record of fumigation at the time they are taken. This includes readings taken prior to achieving start time or optional readings during the exposure period. Readings from additional concentration monitoring locations that are mandated by import conditions must also be recorded.
- 9.1.4 The time each set of concentration readings was taken must be recorded. If there is more than one reading in a set, the time the last reading was completed must be the time recorded.

Note: Additional readings can be taken at any time during the exposure period to check concentrations are equal to or above the levels required for an effective treatment.

9.2 Gas concentration monitoring – multiple sea containers in a sheeted stack

9.2.1 Section 9.2 applies if:

- a) the fumigation enclosure is a sheeted enclosure with multiple sea containers, and
- b) the target of the fumigation is contained wholly inside the sea containers.

9.2.2 The fumigator may fail one single container in the sheeted enclosure, and pass the remainder of the sea containers in that enclosure, if:

- c) concentration readings fall below the standard in one single container, and, the enclosure is not, or cannot be, topped up in compliance with the topping up requirements, and
- d) all other concentration readings in all other containers are above the standard for all other concentration readings during the exposure period.

格式化: 標題 3, 無, 不與下段同頁, 在段落中分頁

已註解 [BM17]: Added to allow single container to fail - Comment #33 - 34

格式化: Methyl bromide numbered, 無, 間距 套用前: 0 點, 套用後: 0 點, 在段落中分頁

格式化: Methyl bromide numbered, 無, 間距 套用前: 0 點, 套用後: 0 點, 在段落中分頁

10 Topping-up methyl bromide levels

10.1 Topping-up during the exposure period

- 10.1.1 Additional methyl bromide may be added to the enclosure at any time during the exposure period if:
- a) all the concentration readings are above the standard concentration (Appendix 4: [Table 3 Methyl bromide monitoring table, fumigation phase](#)) and
 - b) the lowest concentration reading is below the maximum top-up concentration (Appendix 4: [Table 3 Methyl bromide monitoring table, fumigation phase](#)), and
 - c) the treatment schedule allows top-ups.
- 10.1.2 If a top-up is performed during the original exposure period, no extension of the exposure period is required.
- 10.1.3 Multiple top-ups are permitted during the exposure period.

10.2 Topping-up at the end of the exposure period

- 10.2.1 If the lowest concentration reading at the end of the exposure period is below the standard concentration but not below the minimum concentration to allow top-up ([Appendix 4: Methyl bromide monitoring tables](#)), additional methyl bromide may be added to the enclosure.
- 10.2.2 If a top-up is performed at the end of the exposure period, the fumigation must be extended for [the minimum time specified in the treatment schedule. If no time extension is specified, the minimum time extension is at least another](#) four hours.
- 10.2.3 After the minimum four-hour extension time, readings must be taken from all sampling lines and the concentrations must be equal to or above the standard concentration required for the original exposure period, if not, the fumigation has failed.
- 10.2.4 Only one top-up at the end of the exposure period is permitted.
- 10.2.5 Topping-up the concentration at the end of the exposure period is not permitted if:
- a) the lowest concentration reading is below the minimum concentration to allow top-up (Appendix 4: [Table 3 Methyl bromide monitoring table, fumigation phase](#)); or
 - b) the treatment schedule prohibits topping-up.

10.3 Performing the top-up

- 10.3.1 The weight of methyl bromide for top-up must be calculated by subtracting the lowest concentration reading from the maximum to allow top-up concentration contained in [Appendix 4: Methyl bromide monitoring tables](#), and multiplied by the volume of the enclosure.

已註解 [BM18]: Added comment - #53

Top-up amount (g) = Enclosure volume (m³) x (Maximum to allow top-up – Lowest concentration reading)

- 10.3.2 The top-up amount for formulations that contain less than 100% methyl bromide and round up must be performed in accordance with section [8.2 Calculating the dose](#).
- 10.3.3 The top-up amount must be injected into the fumigation enclosure in accordance with section [8.3 Injecting methyl bromide into the fumigation enclosure](#).
- 10.3.4 When the additional methyl bromide has circulated, a concentration reading must be taken from the monitoring location that had the lowest reading to verify that the methyl bromide is back above the standard concentration.
- 10.3.5 Top-up details (amount, time and concentration readings) must be recorded on the record of fumigation.
- 10.3.6 If top-ups are performed equilibrium is not required.

11 Ventilating the fumigation enclosure

11.1 Threshold limit value (TLV)

- 11.1.1 The TLV is 5 parts per million (ppm) for methyl bromide unless a lower concentration is imposed by the relevant authorities in the jurisdiction where the fumigation takes place or the consignment destination.
- 11.1.2 The equipment used for measuring TLV must be able to measure the actual concentration, not just the presence of methyl bromide, to at least 1 ppm.
- 11.1.3 If stain tubes are used to detect methyl bromide, they must be used:
 - a) in accordance with the manufacturer's instructions; and
 - b) in conjunction with the sampling pump specified by the manufacturer; and
 - c) before the expiry date.

11.2 Releasing methyl bromide from the enclosure

- 11.2.1 At the end of the exposure period, the methyl bromide must be fully ventilated from the enclosure in a controlled and safe manner.
- 11.2.2 A risk assessment must be performed to manage the ventilation process and ensure it is safe by considering:
 - a) prevailing wind direction; and
 - b) location and proximity of unprotected personnel; and
 - c) extension of the exclusion zone (see section [5.1 Establish an exclusion zone](#)) around the enclosure if required to prevent unprotected personnel in the vicinity from being exposed to methyl bromide levels above the TLV.

- 11.2.3 Personnel who are not wearing PPE (in accordance with section [2.3 Personal protective equipment \(PPE\)](#)) are not permitted to enter the exclusion zone until the fumigator-in-charge verifies the concentration in the area and throughout the enclosure is at or below the TLV.
- 11.2.4 The enclosure must be ventilated until the concentration of methyl bromide within the enclosure remains at or below the TLV.
- 11.2.5 If the consignment is fumigated in the sea container(s) that will be used to transport the goods, each container must be checked individually to verify concentration at or below the TLV.
- 11.2.6 If the consignment is fumigated in an un-sheeted sea container, the sea container must not be moved until the methyl bromide concentration inside the enclosure is at or below the TLV.
- 11.2.7 If the consignment is a perishable commodity fumigation, packed in cartons and/or bags that have been opened during fumigation, the cartons and/or bags can only be closed once the methyl bromide concentration inside the cartons and/or bags is under the TLV.
- 11.2.8 The TLV readings and the time they were taken must be recorded on the record of fumigation.

11.3 Releasing the consignment from the control of the fumigator-in-charge

- 11.3.1 Following a fumigation, the consignment can only be released from the control of the fumigator-in-charge once the following requirements have been met:
- a) the fumigation complies with the requirements of this methodology and the methyl bromide concentration has been verified at or below the TLV, or
 - b) the fumigation has failed, and it is subsequently unsuitable for further fumigation with methyl bromide and the methyl bromide concentration has been verified at or below the TLV.

12 Documentation

12.1 Retainment of fumigation documents

- ~~12.1.1~~ [12.1.1](#) The treatment provider must keep a copy of all fumigation documentation for a minimum of two years.

~~12.1~~12.2 Record of fumigation

- ~~12.1.1~~[12.2.1](#) A record of fumigation must be produced to demonstrate the fumigation complied with the requirements of this methodology.
- ~~12.1.2~~[12.2.2](#) The record of fumigation must be completed on the fumigation site as the tasks are performed.

格式化: Methyl bromide numbered, 段落遺留字串控制, 不與下段同頁, 在段落中分頁

已註解 [BM19]: Added in response to NZ suggested amendment - add administration clause.

12.1.312.2.3 The record of fumigation must be retained by the treatment provider for a minimum of two years.

12.1.412.2.4 False or misleading information must not be recorded on a record of fumigation.

12.1.512.2.5 At a minimum the record of fumigation must include:

- a) treatment provider identification
- b) client name
- c) start date and time of the fumigation
- d) location – the site address where the fumigation was performed
- e) a description of the consignment
- f) the target of fumigation
- g) consignment identification - container number(s), bill of lading, silo/shed number or other means to clearly identify the consignment
- h) a declaration that the consignment complies with the treatment schedule, import conditions, and all requirements of the Methyl Bromide Fumigation Methodology
- i) type of enclosure used
- j) enclosure volume
- k) the specified treatment schedule - dose rate, ~~and~~ exposure period, and temperature
- l) dose rate used – the dose rate used for the fumigation (if dose compensation for temperature variation is applied the temperature adjusted dose rate is recorded)
- m) calculated dose – dose rate used multiplied by the enclosure volume, expressed as weight of methyl bromide
- n) amount methyl bromide applied - the actual volume of methyl bromide injected into the enclosure, expressed as weight of methyl bromide
- o) the time the methyl bromide injection into the enclosure was complete
- p) the concentration readings from each concentration monitoring location and the time they were taken
- q) result of the equilibrium calculation
- r) serial number of the gas concentration monitoring device(s) used (minimum last 4 digits of the serial number)
- s) the TLV readings and the time and date they were taken
- t) the name and signature of the fumigator-in-charge
- u) initial or signature of the fumigator at each concentration reading stage and TLV reading,

12.1.612.2.6 If the fumigation is an ambient temperature fumigation (section 6.1 Ambient temperature fumigations), the forecast minimum temperature must be recorded on the record of fumigation.

已註解 [BM20]: Added in repose to NZ - Comment #56

~~12.1.7~~12.2.7 If the fumigation is a controlled temperature fumigation (section [6.2 Controlled temperature fumigations](#)), the minimum temperature achieved within the enclosure must be recorded on the record of fumigation.

~~12.1.8~~12.2.8 If the fumigation is a perishable commodity fumigation or if the temperature of the goods must be verified (section [6.3 Perishable commodity fumigation](#)), the temperature of the goods must be recorded on the record of fumigation.

~~12.1.9~~12.2.9 If the fumigation is a perishable commodity fumigation (section [6.3 Perishable commodity fumigation](#)), the load factor and retention rate must be recorded on the record of fumigation.

~~12.1.10~~12.2.10 If additional fumigant was added to the fumigation (in accordance with section [10 Topping up the methyl bromide levels](#)), the top-up amount, time and concentration must be recorded on the record of fumigation.

Note: An example record of treatment is provided at [Appendix 1: Example record of fumigation](#) and [Appendix 2: Example record of fumigation perishable commodity](#).

~~12.2~~12.3 Fumigation treatment certificate

~~12.2.1~~12.3.1 A fumigation treatment certificate is issued once the fumigator-in-charge determines the fumigation has complied with requirements of this methodology.

~~12.2.2~~12.3.2 False or misleading information must not be recorded on a fumigation treatment certificate.

~~12.2.3~~12.3.3 At a minimum the fumigation treatment certificate must include:

- a) treatment provider's letterhead including name and physical address
- b) treatment provider's identification (AEI if an AEI is required by the treatment scheme or import conditions)
- c) certificate number
- d) name of fumigant
- e) target of fumigation
- f) description
- g) quantity
- h) consignment link (such as container number, bill of lading, invoice number)
- i) country or origin
- j) port of loading
- k) country of destination
- l) date and time fumigation commenced
- m) date and time fumigation completed
- n) place of fumigation (site registration number if applicable)
- o) type of enclosure used

- p) treatment schedule [prescribed dose rate/ specified dose rate (g/m³)]
- q) exposure period (hours)
- r) forecast minimum temperature (°C) or minimum temperature achieved in the enclosure or commodity core temperature.
- s) applied dose rate (g/m³)
- t) final TLV reading (ppm)
- u) a declaration that the consignment complies with the treatment schedule, import conditions, and all requirements of the Methyl Bromide Fumigation Methodology
- v) the signature of the fumigator-in-charge and date of signing
- w) date the certificate was endorsed and issued.

Note: An example fumigation treatment certificate is provided at [Appendix 3: Example fumigation treatment certificate](#)

~~12.2.4 The treatment provider must keep a copy of all fumigation treatment certificates for a minimum of two years.~~

~~12.2.5~~12.3.4 The treatment provider must make all fumigation documentation available on request, by the relevant authorities, for audit and registration purposes.

~~12.2.6~~12.3.5 The fumigation treatment certificate must be travel clearly linked with to the consignment, related documentation to demonstrate it has been effectively treated for QPS purposes.

已註解 [BM21]: Moved up - new section 12.1.1 - Comment #60

已註解 [BM22]: Amended - Comment #61

Appendix 1: Example record of fumigation

[Insert your business logo or letterhead]

(including address as it appears on the treatment provider list)

| Record of fumigation – Methyl bromide fumigation (non-perishable commodity) | | | | | | | | | | |
|--|---|---|-----------------------|---|---|---|------------------------------|---------------------|--------------|----------------------|
| Section A: Fumigator in charge | | | | | | | | | | |
| Full Name | | | | | | Accreditation number (if applicable) | | | | |
| Section B: Job details | | | | | | | | | | |
| Treatment provider ID | | | | | | Client name/details | | | | |
| Job identification number | | | | | | | | | | |
| Location of fumigation | | | | | | Description of consignment | | | | |
| Street address | | | | | | Target of fumigation | | | | |
| Suburb/town/city | | | | | | | | | | |
| Country Postcode | | | | | | | | | | |
| Consignment identification/Container numbers | | | | | | | | | | |
| Section C: Fumigation details | | | | | | | | | | |
| Specified treatment schedule | | | | | | Enclosure type (select one) | | | | |
| Dose rate (g/m ³) | | | Exposure period (hrs) | | | <input type="checkbox"/> Sheeted enclosure <input type="checkbox"/> Fumigation chamber <input type="checkbox"/> Un-sheeted container(s) <input type="checkbox"/> Other _____ | | | | |
| Consignment suitability (Section 3 of the methodology) | | | | | | Enclosure volume | | | | |
| Was the consignment suitable for fumigation? | | | | | | Length | | Height | | Width (m) |
| <input type="checkbox"/> Yes – consignment suitable <input type="checkbox"/> No – remedial action taken | | | | | | Total volume | | (m ³) | | |
| If no, what action? | | | | | | Dose | | | | |
| Fumigation type (select one) | | | | | | Dose rate used | | (g/m ³) | | |
| <input type="checkbox"/> Ambient temperature: Forecast min temp | | | °C/°F | | | Calculated dose | | (g) | | |
| <input type="checkbox"/> Controlled temperature: Min enclosure temp | | | °C/°F | | | If yes: | | | | |
| Heaters used? <input type="checkbox"/> Yes <input type="checkbox"/> No | | | | | | Amount CH ₃ Br applied | | (g) | | |
| Section D: Concentration readings Monitoring readings by locations - Each reading must be initialised by the fumigator(s) who took the reading | | | | | | | | | | |
| Serial number of monitoring device(s) | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | Equilibrium result (%) | Standard (g/m ³) | Date (dd/mm) | Time (hh:mm) | Fumigator/s initials |
| Time and date: Fumigant injection finished | | | | | | | | | | |
| Start | | | | | | % | | | | am/pm |
| | | | | | | % | | | | am/pm |
| During | | | | | | | | | | am/pm |
| | | | | | | | | | | am/pm |
| End | | | | | | | | | | am/pm |
| | | | | | | | | | | am/pm |
| Time and date: Enclosure ventilation start | | | | | | | | | | |
| Final TLV readings (all) | | | | | | ppm | ppm | ppm | | am/pm |
| Top-up details | | | | | | | | | | |
| Amount (g/m ³) | | | Time (hh:mm) | | | Concentration (g/m ³) | | | | |
| Section E: Fumigator declaration - To be completed by the fumigator in charge named in Section A of this record | | | | | | | | | | |
| I, the fumigator-in-charge declare that the fumigation was conducted in accordance with the treatment schedule and all the requirements in the Methyl Bromide Fumigation Methodology, and the information I have provided is true and correct. | | | | | | | | | | |
| Signature | | | | | | Date (dd/mm/yyyy) | | | | |
| Government officer if supervised | | | Name | | | Signature | | | | |

Appendix 2: Example record of fumigation perishable commodity

[Insert your business logo or letterhead]

(including address as it appears on the treatment provider list)

| Record of treatment – Methyl bromide fumigation (perishable commodity) | | | | | | | | | | |
|--|---|---|---|---|---|--|------------------------------|---------------------|------------------------|------------------------|
| Section A: Fumigator in charge | | | | | | | | | | |
| Full Name | | | | | | Accreditation number (if applicable) | | | | |
| Section B: Job details | | | | | | | | | | |
| Treatment provider ID | | | | | | Client name/details | | | | |
| Job identification number | | | | | | | | | | |
| Location of fumigation | | Description of consignment | | | | | | | | |
| Street address | | | | | | | | | | |
| Suburb/town/city | | Target of fumigation | | | | | | | | |
| Country | | | | | | | | | | |
| Postcode | | | | | | | | | | |
| Consignment identification/Container numbers | | | | | | | | | | |
| Section C: Fumigation details | | | | | | | | | | |
| Consignment suitability (section 3 of the methodology) | | | | | | Enclosure volume (m ³) | | | | |
| Was the consignment suitable for fumigation? | | | | | | Length | | Height | | Width (m) |
| <input type="checkbox"/> Yes – consignment suitable <input type="checkbox"/> No – remedial action taken | | | | | | Total volume | | (m ³) | | |
| If no, what action? | | | | | | Dose | | | | |
| Specified treatment schedule | | | | | | Dose rate used | | (g/m ³) | | |
| Dose rate (g/m ³) | | Exposure period (hrs) | | Calculated dose | | (g) | | | | |
| Temperature (°C) | | | | Chloropicrin <input type="checkbox"/> Yes <input type="checkbox"/> No | | If yes: | | % | | |
| Retention rate (%) | | or CT product | | Amount CH3Br applied | | (g) | | | | |
| Temperature probe location | | | | | | Load factor | | | | |
| <input type="checkbox"/> Inside packaging | | <input type="checkbox"/> Inserted into pulp | | Maximum | | % | | Estimated | | % |
| Section D: Concentration and temperature readings | | | | | | | | | | |
| Temperature readings (°C) Each reading must be signed by the fumigator(s) who took the reading | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | Date (dd/mm) | Time (h:mm) | Fumigator(s) signature | |
| | | | | | | | | | am/pm | |
| | | | | | | | | | am/pm | |
| | | | | | | | | | am/pm | |
| | | | | | | | | | am/pm | |
| Monitoring readings by locations Each reading must be signed by the fumigator(s) who took the reading | | | | | | | | | | |
| Serial number of monitoring device(s) | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | Equilibrium result (%) | Standard (g/m ³) | Date (dd/mm) | Time (h:mm) | Fumigator(s) signature |
| | | | | | | Time and date: Fumigant injection finished | | | am/pm | |
| Start | | | | | | % | | | am/pm | |
| | | | | | | % | | | am/pm | |
| During | | | | | | | | | am/pm | |
| | | | | | | | | | am/pm | |
| End | | | | | | | | | am/pm | |
| | | | | | | | | | am/pm | |
| Final TLV readings (all) | | | | | | ppm | ppm | | am/pm | |
| Section E: Fumigator declaration - To be completed by the fumigator in charge named in Section A of this record | | | | | | | | | | |
| I, the fumigator-in-charge declare that the fumigation was conducted in accordance with the treatment schedule and all the requirements in the Methyl Bromide Fumigation Methodology, and the information I have provided is true and correct. | | | | | | | | | | |
| Signature | | | | | | Date (dd/mm/yyyy) | | | | |
| Government officer if supervised | | Name | | | | Signature | | | | |

Appendix 3: Example fumigation treatment certificate

| | | | |
|--|------------------------------------|--|---|
| <div> <div> <div></div> <div> <div>Insert your business logo or letterhead</div> <div>(Including address as it appears on the treatment provider list)</div> </div> </div> <div> <div>Date issued (dd/mm/yyyy)</div> <div></div> </div> </div> | | | |
| Treatment certificate – Methyl bromide fumigation | | | |
| Certificate number | | Treatment provider ID number <div>Registration/AS/AA/333</div> | |
| Consignment details | | | |
| Consignment link (container numbers if applicable) | | | |
| Seal numbers(s) (if applicable) | | | |
| Client name | | | |
| Client Address | | | |
| Commodity description | | | |
| Commodity country of origin | | Commodity quantity | |
| Port of loading | | Destination country | |
| Target of fumigation (pick all that apply) | | Enclosure type (pick one) | |
| <input type="checkbox"/> Commodity | <input type="checkbox"/> Container | <input type="checkbox"/> Packaging | <input type="checkbox"/> Sheeted enclosure |
| | | | <input type="checkbox"/> Fumigation chamber |
| | | | <input type="checkbox"/> Un-sheeted container |
| <input type="checkbox"/> Other (provide details) | | <input type="checkbox"/> Other (provide details) | |
| Treatment schedule (prescribed/specified treatment schedule) | | | |
| Dose rate (g/m3) | Exposure period (hours) | Temperature (°C) | |
| | | | |
| Fumigation details (treatment applied) | | | |
| Applied dose (g/m3) | Exposure period (hours) | Temperature (°C) | |
| Place of fumigation (Full address) | | Street address | |
| | | Suburb/town/city | |
| | | Country | Postcode |
| Date and time fumigation completed (dd/mm/yyyy – HH:MM) | | am/pm | |
| Final TLV reading (ppm) | | ppm | |
| Declaration | | | |
| I, the fumigator-in-charge declare: | | | |
| 1. The fumigation certified was conducted in accordance with the treatment schedule, import conditions, and all the requirements in the Methyl Bromide Fumigation Methodology, and | | | |
| 2. The information I have provided is true and correct. | | | |
| Signature (sign your name) | | Date (dd/mm/yyyy) | |
| Full name | | Accreditation number | |
| Additional Declarations | | | |
| | | | |
| | | | |
| | | | |

Appendix 4: Methyl bromide monitoring tables

Table 2 Methyl bromide monitoring table, gas distribution phase

| Category | Timing | Dose ^a | Standard concentration (g/m ³) | | | | | | | | |
|--------------|------------------|-------------------|--|----|------|------|------|------|----|------|-------|
| Initial dose | 0 hours | 100% | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 128 |
| Start point | ¼ to ½ hour | 85% or more | 27.2 | 34 | 40.8 | 47.6 | 54.4 | 61.2 | 68 | 74.8 | 108.8 |
| | ½ to 1 hour | 75% or more | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 96 |
| | More than 1 hour | 70% or more | 22.4 | 28 | 33.6 | 39.2 | 44.8 | 50.4 | 56 | 61.6 | 89.6 |

^a % of initial dose

Notes: Dosing is complete once the required amount of gas has been applied to the enclosure. Start Point is achieved when all concentration readings are at or above the standard. Maximum top-up concentration is 100% of initial dose.

Table 3 Methyl bromide monitoring table, fumigation phase

| Timing | Dose ^a | Concentration (category) | Concentration (g/m ³) | | | | | | | | |
|-----------------------|-------------------|--------------------------|-----------------------------------|------|------|------|------|------|------|------|-------|
| 0 hours: initial dose | 100% | Standard | 32.0 | 40.0 | 48.0 | 56.0 | 64.0 | 72.0 | 80.0 | 88.0 | 128.0 |
| 2 hours | 60% or more | Standard | 19.2 | 24.0 | 28.8 | 33.6 | 38.4 | 43.2 | 48.0 | 52.8 | 76.8 |
| | | Minimum to allow top-up | 14.2 | 19.0 | 23.8 | 28.6 | 30.4 | 35.2 | 40.0 | 44.8 | 68.8 |
| | | Maximum top-up | 24.2 | 29.0 | 33.8 | 38.6 | 46.4 | 51.2 | 56.0 | 60.8 | 84.8 |
| 4 hours | 50% or more | Standard | 16.0 | 20.0 | 24.0 | 28.0 | 32.0 | 36.0 | 40.0 | 44.0 | 64.0 |
| | | Minimum to allow top-up | 11.0 | 15.0 | 19.0 | 23.0 | 24.0 | 28.0 | 32.0 | 36.0 | 56.0 |
| | | Maximum top-up | 21.0 | 25.0 | 29.0 | 33.0 | 40.0 | 44.0 | 48.0 | 52.0 | 72.0 |
| 12 hours | 35% or more | Standard | 11.2 | 14.0 | 16.8 | 19.6 | 22.4 | 25.2 | 28.0 | 30.8 | 44.8 |
| | | Minimum to allow top-up | 6.2 | 9.0 | 11.8 | 14.6 | 14.4 | 17.2 | 20.0 | 22.8 | 36.8 |
| | | Maximum top-up | 16.2 | 19.0 | 21.8 | 24.6 | 30.4 | 33.2 | 36.0 | 38.8 | 52.8 |
| 24 hours | 30% or more | Standard | 9.6 | 12 | 14.4 | 16.8 | 19.2 | 21.6 | 24 | 26.4 | 38.4 |

| Timing | Dose ^a | Concentration (category) | Concentration (g/m ³) | | | | | | | | |
|----------|-------------------|--------------------------|-----------------------------------|------|------|------|------|------|------|------|------|
| 48 hours | 25% or more | Minimum to allow top-up | 4.6 | 7.0 | 9.4 | 11.8 | 11.2 | 13.6 | 16.0 | 18.4 | 30.4 |
| | | Maximum top-up | 14.6 | 17 | 19.4 | 21.8 | 27.2 | 29.6 | 32.0 | 34.4 | 46.4 |
| | | Standard | 8.0 | 10.0 | 12.0 | 14.0 | 16.0 | 18.0 | 20.0 | 22.0 | 32.0 |
| | | Minimum to allow top-up | 3.0 | 5.0 | 7.0 | 9.0 | 8.0 | 10.0 | 12.0 | 14.0 | 24.0 |
| | | Maximum top-up | 13.0 | 15.1 | 17.0 | 19.0 | 24.0 | 26.0 | 28.0 | 30.0 | 40.0 |

a % of initial dose

Notes: Dosing is complete once all the required amount of gas has been applied to the enclosure. Start point is achieved when all concentration readings are at or above the standard. The duration of the fumigation is measured from when the start point is achieved. For example, if a 24-hour fumigation reaches start point 1½ hours after dosing, the fumigation is completed 25½ hours after applying the dose and all concentrations are at or above the standard specified for 24 hours.

Table 4 Methyl bromide minimum standard concentrations

| Timing (hours) | Retention (%) | | Minimum standard concentration required (g/m ³) ^a | | | | | | | | | | | | |
|----------------|---------------|-------|--|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--|
| 0 ^b | 100.00 | 32 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 128 | 136 | 144 | 152 | |
| ½ | 75.00 | 24.00 | 36.00 | 42.00 | 48.00 | 54.00 | 60.00 | 66.00 | 72.00 | 78.00 | 96.00 | 102.00 | 108.00 | 114.00 | |
| 1 | 70.00 | 22.40 | 33.60 | 39.20 | 44.80 | 50.40 | 56.00 | 61.60 | 67.20 | 72.80 | 89.60 | 95.20 | 100.80 | 106.40 | |
| 2 | 60.00 | 19.20 | 28.80 | 33.60 | 38.40 | 43.20 | 48.00 | 52.80 | 57.60 | 62.40 | 76.80 | 81.60 | 86.40 | 91.20 | |
| 3 | 54.80 | 17.54 | 26.30 | 30.69 | 35.07 | 39.46 | 43.84 | 48.22 | 52.61 | 56.99 | 70.14 | 74.53 | 78.91 | 83.30 | |
| 4 | 50.00 | 16.00 | 24.00 | 28.00 | 32.00 | 36.00 | 40.00 | 44.00 | 48.00 | 52.00 | 64.00 | 68.00 | 72.00 | 76.00 | |
| 5 | 47.80 | 15.30 | 22.94 | 26.77 | 30.59 | 34.42 | 38.24 | 42.06 | 45.89 | 49.71 | 61.18 | 65.01 | 68.83 | 72.66 | |
| 6 | 45.70 | 14.62 | 21.94 | 25.59 | 29.25 | 32.90 | 36.56 | 40.22 | 43.87 | 47.53 | 58.50 | 62.15 | 65.81 | 69.46 | |
| 7 | 43.70 | 13.98 | 20.98 | 24.47 | 27.97 | 31.46 | 34.96 | 38.46 | 41.95 | 45.45 | 55.94 | 59.43 | 62.93 | 66.42 | |
| 8 | 41.80 | 13.38 | 20.06 | 23.41 | 26.75 | 30.10 | 33.44 | 36.78 | 40.13 | 43.47 | 53.50 | 56.85 | 60.19 | 63.54 | |
| 9 | 40.00 | 12.80 | 19.20 | 22.40 | 25.60 | 28.80 | 32.00 | 35.20 | 38.40 | 41.60 | 51.20 | 54.40 | 57.60 | 60.80 | |
| 10 | 38.30 | 12.26 | 18.38 | 21.45 | 24.51 | 27.58 | 30.64 | 33.70 | 36.77 | 39.83 | 49.02 | 52.09 | 55.15 | 58.22 | |
| 11 | 36.60 | 11.71 | 17.57 | 20.50 | 23.42 | 26.35 | 29.28 | 32.21 | 35.14 | 38.06 | 46.85 | 49.78 | 52.70 | 55.63 | |

| Timing (hours) | Retention (%) | | | Minimum standard concentration required (g/m ³) ^a | | | | | | | | | | | |
|----------------|---------------|-------|-------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| 12 | 35.00 | 11.20 | 16.80 | 19.60 | 22.40 | 25.20 | 28.00 | 30.80 | 33.60 | 36.40 | 44.80 | 47.60 | 50.40 | 53.20 | |
| 16 | 33.35 | 10.67 | 16.01 | 18.68 | 21.34 | 24.01 | 26.68 | 29.35 | 32.02 | 34.68 | 42.69 | 45.36 | 48.02 | 50.69 | |
| 20 | 31.65 | 10.13 | 15.19 | 17.72 | 20.26 | 22.79 | 25.32 | 27.85 | 30.38 | 32.92 | 40.51 | 43.04 | 45.58 | 48.11 | |
| 24 | 30.00 | 9.60 | 14.40 | 16.80 | 19.20 | 21.60 | 24.00 | 26.40 | 28.80 | 31.20 | 38.40 | 40.80 | 43.20 | 45.60 | |
| 28 | 29.15 | 9.33 | 13.99 | 16.32 | 18.66 | 20.99 | 23.32 | 25.65 | 27.98 | 30.32 | 37.31 | 39.64 | 41.98 | 44.31 | |
| 32 | 28.31 | 9.06 | 13.59 | 15.85 | 18.12 | 20.38 | 22.65 | 24.91 | 27.18 | 29.44 | 36.24 | 38.50 | 40.77 | 43.03 | |
| 36 | 27.47 | 8.79 | 13.19 | 15.38 | 17.58 | 19.78 | 21.98 | 24.17 | 26.37 | 28.57 | 35.16 | 37.36 | 39.56 | 41.75 | |
| 40 | 26.64 | 8.52 | 12.79 | 14.92 | 17.05 | 19.18 | 21.31 | 23.44 | 25.57 | 27.71 | 34.10 | 36.23 | 38.36 | 40.49 | |
| 44 | 25.82 | 8.26 | 12.39 | 14.46 | 16.52 | 18.59 | 20.66 | 22.72 | 24.79 | 26.85 | 33.05 | 35.12 | 37.18 | 39.25 | |
| 48 | 25.00 | 8.00 | 12.00 | 14.00 | 16.00 | 18.00 | 20.00 | 22.00 | 24.00 | 26.00 | 32.00 | 34.00 | 36.00 | 38.00 | |

a If the concentration measuring instrument used can only read in whole grams then the minimum standard concentration must be rounded up to the nearest whole number. **b** Initial dose. **Notes:** Minimum concentration to allow top-up is 5 g/m³ below the standard concentration for initial doses of 32 to 56 g/m³. Minimum concentration to allow top-up is 8 g/m³ below the standard concentration for initial doses of 64 to 152 g/m³. Maximum top-up concentration is 5 g/m³ above the standard concentration for initial doses of 32 to 56 g/m³. Maximum top-up concentration is 8 g/m³ above the standard concentration for initial doses of 64 to 152 g/m³. Concentration readings must be equal to or above the required concentrations specified for the hour preceding the reading – for example, a reading taken at 2½ hours must be equal to or above the concentrations specified at 2 hours.

Table 5 Methyl bromide minimum concentrations for fumigations that require 80% retention

| Concentration | | Minimum standard concentration required (g/m ³) ^a | | | | | | | | | | | |
|---------------|------|--|------|------|------|------|------|------|------|-------|-------|-------|-------|
| Starting | 32 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 128 | 136 | 144 | 152 |
| Minimum | 25.6 | 38.4 | 44.8 | 51.2 | 57.6 | 64.0 | 70.4 | 76.8 | 83.2 | 102.4 | 108.8 | 115.2 | 121.6 |

a If the instrument used only reads in whole grams, the standard concentration must be rounded up to the nearest whole number.

Table 65 Methyl bromide monitoring ready reckoner

| Dosing Phase | Initial Dose | 32 g/m ³ | 40 g/m ³ | 48 g/m ³ | 56 g/m ³ | 64 g/m ³ | 72 g/m ³ | 80 g/m ³ | 88 g/m ³ | 128 g/m ³ | Dosing is complete once ALL the required amount of gas has been applied to the enclosure. |
|--|---|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|---|
| Gas Distribution Phase Start Point | ¼ - ½ hr 85% or more of initial dose | 32 27.2 | 40 34 | 48 40.8 | 56 47.6 | 64 54.4 | 72 61.2 | 80 68 | 88 74.8 | 128 108.8 | Start Point is achieved when ALL concentration readings are at or above the Standard. |
| | ½ - 1 hr 75% or more of initial dose | 32 24 | 40 30 | 48 36 | 56 42 | 64 48 | 72 54 | 80 60 | 88 66 | 128 96 | |
| | > 1 hr 70% or more of initial dose | 32 22.4 | 40 28 | 48 33.6 | 56 39.2 | 64 44.8 | 72 50.4 | 80 56 | 88 61.6 | 128 89.6 | |
| Fumigation Phase Methyl Bromide Concentration After Start Point | 2 hrs 60% or more of initial dose | 24.2 19.2 | 29 24 | 33.8 28.8 | 38.6 33.6 | 46.4 38.4 | 51.2 43.2 | 56 48 | 60.8 52.8 | 84.8 76.8 | The duration of the fumigation is measured from when the Start Point is achieved. For example, if a 24 hr fumigation reaches Start Point 1 ½ hrs after dosing, the fumigation is completed 25 ½ hrs after applying the dose and ALL concentrations are at or above the standard specified for 24 hrs. |
| | 4 hrs 50% or more of initial dose | 21 16 | 25 20 | 29 24 | 33 28 | 40 32 | 44 36 | 48 40 | 52 44 | 72 64 | |
| | 12 hrs 35% or more of initial dose | 16.2 11.2 | 19 14 | 21.8 16.8 | 24.6 19.6 | 30.4 22.4 | 33.2 25.2 | 36 28 | 38.8 30.8 | 52.8 44.8 | |
| | 24 hrs 30% or more of initial dose | 14.6 9.6 | 17 12 | 19.4 14.4 | 21.8 16.8 | 27.2 19.2 | 29.6 21.6 | 32 24 | 34.4 26.4 | 46.4 38.4 | |
| | 48 hrs 25% or more of initial dose | 13 8 | 15 10 | 17 12 | 19 14 | 24 16 | 26 18 | 28 20 | 30 22 | 40 32 | |



A = Standard Concentration
 B = Minimum concentration to allow top-up
 C = Maximum top-up concentration

Glossary

| Term | Definition |
|---------------------------------------|--|
| Ambient temperature | The air temperature of the surrounding area where the fumigation will be performed. |
| Ambient temperature fumigation | When the enclosure being fumigated is subject to environmental ambient temperatures or outdoors. |
| Carton | Box, often cardboard or polystyrene, in which perishable commodities are packed for transport and sale. |
| Chloropicrin | A strong-smelling chemical commonly added to the odourless methyl bromide to indicate the presence of gas. |
| Commodity | The item or goods that are being exported or imported. |
| Concentration | The amount of methyl bromide present at a certain point in the fumigation enclosure, usually expressed as grams per cubic metre (g/m ³). |
| Concentration sampling tube | A small diameter tube used to draw a sample of gas/air mixture from within a fumigation enclosure to measure the methyl bromide concentration. |
| Consignment | Refers collectively to the commodity, any packing materials used and the mode of transport such as sea container. |
| Controlled temperature fumigation | When an artificial heat source is used to heat and maintain the temperature of an enclosure during a fumigation. |
| Dose | The amount of methyl bromide injected to a fumigation enclosure. |
| Dose rate | The prescribed concentration of methyl bromide to be used per unit of volume and the exposure period (temperature adjusted if applicable). |
| Enclosure | Any gas-tight space intended to contain sufficient concentrations of methyl bromide for a period of time. Common examples of fumigation enclosures used for QPS fumigations are (but not limited to) un-sheeted sea containers, semi-permanent or permanent structures, sheeted enclosures, vessel holds, silos and bunkers. |
| Equilibrium | An even distribution of methyl bromide throughout the enclosure. |
| Exclusion zone | The area around the enclosure to which access is restricted to personnel wearing personal protective equipment. |
| Exposure period | The amount of time, in one continuous block, that the consignment must be exposed to sufficient concentration levels of methyl bromide to be lethal to the targeted pests. |
| Fit for purpose | Equipment that is suitable and appropriate for its intended use. That is, capable of measuring methyl bromide or temperature specifically and in the concentration or temperature ranges necessary to meet the requirements of this methodology. |
| Fumigant | A chemical, which at a particular temperature and pressure can exist in a gaseous state in sufficient concentration and for sufficient time to be lethal to insects and other pests. |
| Fumigation chamber | A gas-tight fumigation enclosure with an inbuilt extraction system. All requirements for fumigation chambers specified in section 4.3 Fumigation chambers |
| Fumigation documentation | Documents and records associated with particular fumigations that is not a record of fumigation. May be hardcopy or softcopy. |
| Fumigation sheets | A sheet (or tarpaulin) used to create a sheeted enclosure that is made of material impermeable to methyl bromide. |
| Fumigator | An individual responsible for conducting fumigation activities under the supervision of the fumigator-in-charge. |
| Fumigator-in-charge | The licenced and/or accredited individual that is responsible for the conduct of the fumigation at the time specific fumigation activities are undertaken. |
| Gas concentration monitoring location | The specified location where gas must be drawn from for the purpose of determining the gas concentration at that location. This is location where concentration sampling tubes or |

| Term | Definition |
|-----------------------------------|--|
| | gas concentration sampling equipment is placed. |
| Goods | Goods includes an animal, a plant, a sample or specimen, a pest, mail or any other article, substance or thing (including, but not limited to, any kind of moveable property). |
| Good working order | State of an item, system or equipment is deemed to be functioning properly, without significant defects or impairments that hinder its intended operations or performance. |
| Impermeable package and wrappings | Intact and solid plastic films and wrappings that prevent or impede gas exchange. |
| Load factor | Specifies the maximum volume of space that the commodity can occupy in the enclosure to achieve rapid fumigation circulation. Normally expressed as a percentage (for example, maximum load factor of 50%) |
| Manufacturer's instructions | Specific details on equipment produced by the equipment manufacturer. May include instruction manuals, operating instructions, conditions of use or calibration information. |
| Maximum top-up concentration | The concentration used to calculate the amount of methyl bromide to be added to the enclosure when topping-up. |
| Minimum top-up concentration | The absolute minimum concentration below which levels methyl bromide concentration must not be below to allow top-up at the end of the exposure period. |
| Pascal (Pa) | The standard international unit for pressure. Standard atmospheric pressure is 101.325 kPa. |
| Perishable commodities | Commodities such as, cut flowers, fresh fruit, fresh vegetables, fresh leaves, fresh herbs, fresh fungi and nursery stock that will deteriorate rapidly if not stored or transported under suitable conditions. |
| Pest | Any animal, plant or other organism that may pose a threat to the community or the natural environment. |
| Quarantine pest | A pest of potential economic and/or environmental importance to an area where it is not yet present or is present but not widely distributed and is being officially controlled. |
| Quarantine and Pre-shipment (QPS) | <p>1) 'Quarantine applications', with respect to methyl bromide, are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control, where:</p> <ul style="list-style-type: none"> a) Official control is that performed by, or authorised by, a national plant, animal or environmental protection or health authority. b) Quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled. <p>2) 'Pre-shipment applications' are those non-quarantine applications applied within 21 days prior to export to meet the official requirements of the importing country or existing official requirements of the exporting country.</p> <p>This definition is based on the Montreal Protocol on Substances that Deplete the Ozone Layer. Non-QPS uses of methyl bromide is prohibited under the Montreal Protocol unless a specific exemption is approved by Parties to the Montreal Protocol.</p> |
| Record of fumigation | An official document or electronic record that records the information of section 12 to demonstrate the fumigation complied with requirements. |
| Relevant authority | The government department, ministry or agency responsible for animal and plant biosecurity in the importing or exporting jurisdiction. |
| Risk Assessment | An assessment performed and recorded according to any instructions on the product label, safety data sheet or jurisdictional licence requirements. In the absence of this, a visual inspection to meet the requirements of this methodology that the fumigator-in-charge can verbally describe. |
| Sheeted enclosure | An enclosure created under a gas-proof sheet that is covering/enclosing the commodities to be fumigated. |
| Sheeted stack | Any sheeted enclosure over free standing goods. |
| Sea container | Standardised transportation units that can be moved from one mode of transport to another without needing to unload the contents. |

| Term | Definition |
|-----------------------------|---|
| Standard concentration | The methyl bromide concentration below which the fumigation will not be effective unless additional fumigation is added to the enclosure to compensate. |
| Target of fumigation | The specific object or area that is intended to be treated through the fumigation process. The target of fumigation may be the commodity, packaging material, container, or conveyance or combination of these. |
| Threshold limit value (TLV) | TLV is the maximum concentration of methyl bromide that a person can be repeatedly exposed to in the workplace without harmful effects. This figure is based on an 8-hour day, 40-hour working week. |
| Treatment | Application of a set of specified requirements intended to kill pests and diseases that may be associated with a consignment. |
| Timber | Processed wood harvested from trees, often processed into beams and planks. |
| Timber products | Any product made from timber or wood. |
| Treatment provider | An entity or company that is responsible for the effective conduct of a QPS treatment. |
| Treatment schedule | Specific treatment rates, exposure period and rules as imposed by the relevant authority – usually the importing jurisdiction. |
| Treatment temperature | The temperature at which the applied dose rate was calculated. |
| Vacuum chamber | A rigid enclosure from which air and other gases are removed by a vacuum pump. This results in a low-pressure environment within the chamber. |
| Verifiable weather source | Reliable source of weather data that can be independently confirmed and validated at audit. |

ICCBA MB TECHNICAL WORKING GROUP DELEGATES

| Member Agency | Agency Participants | Member Agency | Agency Participants |
|---------------|--|---------------|---|
| New Zealand | Mr Ken Glassey Ms Genalin Flaminiano | Sri Lanka | Ms L Champika Hewage Ms M Sanjeewani |
| Australia | Mr Sam Griffiths Ms Marian Blake | PNG | Mr Alphonse Bannick Mr Wesley Sawala |
| OIRSA | Mr Ivan Hernandez Mr Raúl Rodas | Philippines | Ms Carmela Rivera Ms Joan-May Tolentino Mr Joseph Banasihan |
| Fiji | Mr Surend Pratap Mr Ronald Prasad | Taiwan | Ms Cindy Weng Dr Kuoshiou Huang |
| Indonesia | Mr Turhadi Noerachman Ms Aprida Cristin Ms Ratih Rahayu | Chile | Ms Paola Tala Ms Maria Carolina Herrera Mr Rodrigo Barra |



International Cargo Cooperative Biosecurity Arrangement

ICCBA

Steering Committee Terms of Reference

Version No: 2.0

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1 Purpose

This document defines the purpose, structure and responsibilities of the International Cargo Cooperative Biosecurity Arrangement (ICCBA) Steering Committee.

2 Function of the ICCBA Steering Committee

As per Paragraph 3.4 of the ICCBA, the ICCBA Steering Committee has responsibility for the overall strategic direction and decision making capacity of the ICCBA and will make decisions on any issues concerning the operation of the ICCBA referred to it by a working group.

3 Responsibilities of the ICCBA Steering Committee

The responsibilities of the ICCBA Steering Committee may include, but are not limited to, sourcing sustainable funding sources and structures, defining and realising benefits for ICCBA, conflict resolution, and monitoring risks, quality and timeliness of outputs achieved and products developed under the arrangement.

The ICCBA Steering Committee will:

1. ensure the ICCBA Statement of Purpose is upheld
2. ensure the requirements of affected stakeholders are met by ICCBA's outputs
3. help balance conflicting priorities and resources within their respective agencies
4. provide guidance to the ICCBA Standing Working Groups, Technical Working Groups and beneficiaries of the ICCBA and its initiatives.
5. consider ideas and issues raised through ICCBA and progress them accordingly
6. review the progress and effectiveness of initiatives developed under ICCBA
7. approve policies and procedures for the Standing Working Groups and Technical Working Groups
8. ensure the overall strategic objectives of ICCBA are met.

4 Role of the Representative of the ICCBA Steering Committee

The role of the representative of the ICCBA Steering Committee includes:

1. attending all meetings of the ICCBA Steering Committee or sending a proxy, where possible
2. sufficiently preparing for all ICCBA Steering Committee meetings and providing input in a timely manner
3. understanding the outcomes of initiatives being pursued through the ICCBA (including the operation of the arrangement itself)

4. being committed to, and actively involved in pursuing, the objectives of ICCBA
5. recognising and where possible, representing the interests of all stakeholders when making decisions regarding the ICCBA and its operation
6. promoting ICCBA and the initiatives progressed through it.

5 General Directions

5.1 Membership

There will be an ICCBA Steering Committee consisting of one named representative from each Member Agency. Member Agencies are considered as those agencies listed in *Appendix I* of the ICCBA.

Any changes in the details of a Steering Committee representative shall be communicated to the Secretariat within 15 days of this change. The Secretariat will notify the other members of the Steering Committee in a timely manner.

5.2 Language

ICCBA encourages the use of as many languages as are needed to ensure the requirements of ICCBA are understood and fulfilled. Member Agencies will be responsible for translating ICCBA documents into languages that will be most useful for their agency and industry.

Subject to agreement, the ICCBA Secretariat will retain copies of all translated material.

5.3 Meetings

Annual face-to-face meetings of the Steering Committee will be held in a Member Country on a rotational basis unless otherwise decided by the Steering Committee.

Each Member Agency should be represented at all Steering Committee meetings wherever possible.

Consultants, technical experts and non-ICCBA Member Agencies may attend meetings of the ICCBA Steering Committee in an observational capacity.

Should there be a need to make decisions out-of-session, then additional meetings may be held as decided by the Steering Committee, either by telephone or computer link or other electronic means, or face-to-face.

All meetings of the ICCBA Steering Committee will be arranged by the ICCBA Secretariat.

5.4 Chair

The Chairperson of the previous meeting will open the meeting and call for nominations for a new Chairperson for the current meeting.

The Chairperson must be a representative of, and appointed by, the Steering Committee and where possible, should be from the country hosting the meeting.

The Chairperson will be supported by the ICCBA Secretariat for the duration of the meeting.

5.5 Proxies to Meetings

Members of the ICCBA Steering Committee shall, where possible, nominate a proxy to attend a meeting if the representative of the Steering Committee is unable to attend.

The nominated proxy shall have the same rights as the individual they are representing.

5.6 Agenda Items

All ICCBA Steering Committee agenda items must be forwarded to the ICCBA Secretariat at least 21 days prior to the next scheduled meeting, unless otherwise agreed.

The ICCBA Steering Committee agenda, with attached meeting papers will be distributed at least 15 days prior to the next scheduled meeting.

5.7 Minutes & Meeting Papers

The Minutes of each ICCBA Steering Committee meeting will be prepared by the ICCBA Secretariat.

Draft copies of the Minutes, including attachments, shall be provided to all ICCBA Steering Committee members for review and comment no later than 15 days following each meeting.

The minutes from each ICCBA Steering Committee meeting shall be finalised and stored on the ICCBA SharePoint, no later than 28 days following each meeting.

By agreement of the ICCBA Steering Committee, out-of-session decisions will be deemed acceptable. Where agreed, all out-of-session decisions shall be recorded in the minutes of the next ICCBA Steering Committee meeting.

5.8 Review Timetable

These terms of reference will be reviewed every three years from the date of acceptance, or as otherwise negotiated by the ICCBA Steering Committee members.

5.9 Resolving Concerns

Any disputes arising from the conduct of ICCBA Steering Committee activities, should, where possible, be resolved under Paragraph 12 of the ICCBA.

International Cargo Cooperative Biosecurity Arrangement (ICCBA) Steering Committee Terms of Reference (ToR) document 3 year review

Summary

As per the Review Timetable set out in section 5.8 of the ICCBA Steering Committee Terms of Reference, the terms must be reviewed every three years from the date of acceptance, or as otherwise negotiated by the ICCBA Steering Committee members.

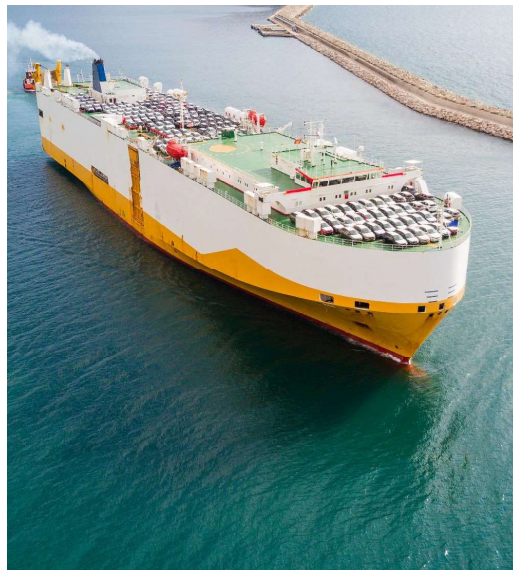
The ToR was sent to ICCBA Member Agencies for comment in 2022. During consultation, comments were received from New Zealand's Ministry for Primary Industries.

| Section | Sub section | Text from document | Comment from member |
|---------|-------------|---|--|
| N/A | N/A | N/A | <p>Comment from New Zealand MPI:</p> <p>MPI suggest adding this section if it is deemed necessary. The intent of this section is to outline the scope and limitations around sharing of information (including those under observational capacities).</p> <p><u>6.0 Confidentiality and information</u> <u>With agreement of the Chairperson, Members and observers are encouraged to may share information about the business of the group with the organisations they represent.</u></p> |
| 2 | N/A | As per Paragraph 3.4 of the ICCBA, the ICCBA Steering Committee has responsibility for the overall strategic direction and decision making capacity of the ICCBA and will make decisions on any issues concerning the operation of the ICCBA referred to it by a working group. | <p>Comment from New Zealand MPI:</p> <p>How will the decision be made? MPI suggest that when ICCBA Steering Committee make a decision, the committee should operate on the basis of consensus or majority of vote (through setting up a quorum).</p> <p>MPI suggest adding a section on how the group should operate:</p> <p>Consensus</p> <p>The group will operate on the basis of consensus and, where it is not possible to achieve a consensus, it should operate on the basis of majority vote. Where full consensus is not reached, the numbers for and against a motion will be noted in the meeting minutes.</p> |

| | | | |
|---|-----|---|---|
| | | | <p>One vote is the maximum permitted for any member agency represented at meetings.</p> <p>If a meeting is attended by more than the allocated number of representatives of a particular member agency, representatives will decide who has voting rights at the beginning of the meeting. The Chair will mediate in this process if and when necessary.</p> <p>Quorum</p> <p>Quorum will be achieved in the presence of XX member agencies.</p> |
| 2 | N/A | As per Paragraph 3.4 of the ICCBA, the ICCBA Steering Committee has responsibility for the overall strategic direction and decision making capacity of the ICCBA and will make decisions on any issues concerning the operation of the ICCBA referred to it by a working group. | <p>Comment from New Zealand MPI:</p> <p>MPI note that: The idea of consensus is a good one for decision making. The idea if ICCBA was one of like minded countries working together for a common goal so we aimed for everyone agreeing or having an out as such. We deliberated moved away from the IPPC model and tried to build an agile group.</p> |
| 2 | | As per Paragraph 3.4 of the ICCBA, the ICCBA Steering Committee has responsibility for the overall strategic direction and decision making-capacity of the ICCBA and will make decisions on any issues concerning the operation of the ICCBA referred to it by a working group. | <p>Suggested change from New Zealand MPI:</p> <p>As per Paragraph 3.4 of the ICCBA, the ICCBA Steering Committee has responsibility for the overall strategic direction and decision-makingdecision-making capacity of the ICCBA and will make decisions on any issues concerning the operation of the ICCBA referred to it by a working group.</p> |
| 5 | 1 | Membership | <p>Comment from New Zealand MPI:</p> <p>MPI suggest including the member rights and obligations? For example, 1) member of the group must ensure that he or she is duly authorised by the organisation to make representations on behalf of the organisation. 2) representatives are responsible for reporting back to their country that they represent</p> |
| 5 | 3 | Consultants, technical experts and non-ICCBA Member Agencies may attend meetings of the ICCBA Steering Committee in an observational capacity. | <p>Comment from New Zealand MPI:</p> <p>Do we need to outline the responsibilities of the observers around confidentiality?</p> |
| 5 | 5 | Proxies to Meetings | <p>Comment from New Zealand MPI:</p> <p>Should this be under the membership rights and obligations section?</p> |

SUPPORTING SAFE AND EFFICIENT TRADE IN ASIA AND THE PACIFIC

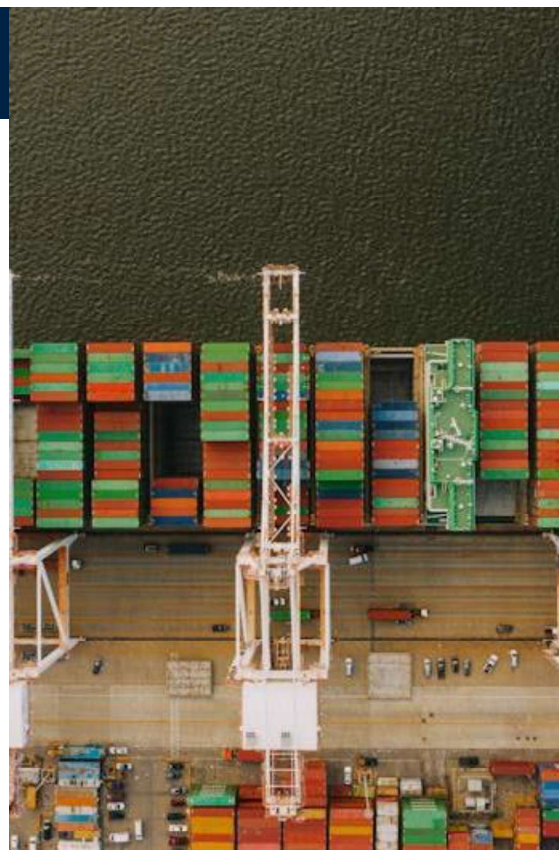
Shane Sela,
Senior Trade Facilitation Specialist



TRADE FACILITATION SUPPORT PROGRAM

- TFSP, a flagship WB technical assistance program, aims to enhance trade facilitation in developing countries, including in Asia and the Pacific region
- Focus on:
 - Identifying bottlenecks in cross-border trade
 - Full and effective implementation of demand-driven practical reforms, and
 - Promoting predictability, transparency, and harmonization of systems and procedures

• Photos provided by Pexels



THE PROCESS

Identifying constraints

- Conduct gap assessments to develop reform plans
- Improved alignment with the WTO TFA
 - predictability
 - transparency, and
 - harmonization of systems and procedures

Enhanced systems

- Establishment and strengthening of National Trade Facilitation Committees.
- Risk-based approaches for border clearance
- Implementation of digital processes - Trade Information Portals, Single Windows, ePhyto, etc.
- Border coordination and collaboration
- Transparency and awareness raising

Partnerships

- Financed by 9 development partners (Australia, Canada, European Commission, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom, the United States).
- Leveraging global and regional partnerships is essential for success, coordination and collaboration



STRATEGY, FINANCING, AND OUTCOMES

Implementation Approach

- Demand-driven, whole of government
- TF reforms bridge public and private sectors
- Implemented through the expertise of the WB and IFC
- Aims to maximize the trade impacts

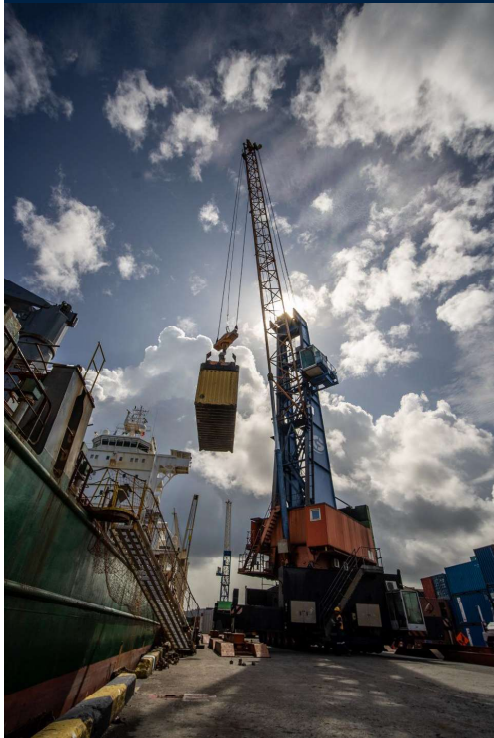
Financial Contributions

- Substantial contributions to technical assistance
- Linkages between financial operations and technical support

Outcomes

- Significant private sector savings, increased efficiency and improved effectiveness of operations
- Completed projects have private sector savings of USD 98.6 million
- Specific reforms in Ethiopia, resulted in USD 61.4 million in private sector savings.





NEPAL AND FIJI

Fiji

- Initiatives on streamlining border operations, improve risk management, enhancing transparency and efficiency
- Proposed financing to support automation

Nepal

- Financing and technical assistance for trade improvements
- implementation of a national single window, ePhyto, other improved workflow management systems
- Gap assessments (PCE/WHO-FAO)
- Implementation of risk-based border management
- Infrastructure enhancements at borders and laboratories.



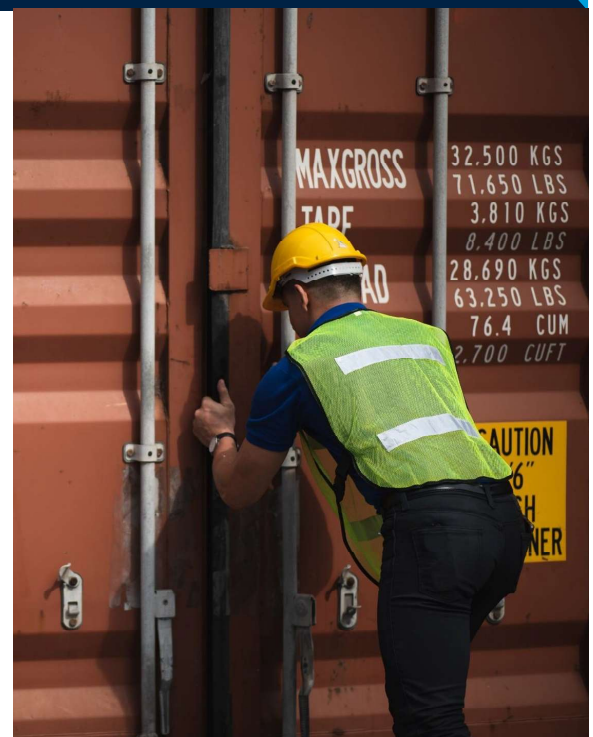
SRI LANKA AND OTHERS

Sri Lanka

- Guidance and technical assistance to NTFC
- Coordinated risk management among border agencies
- implementation of notifications of enhanced controls and expedited shipments
- Other Customs improvements

Other Support

- Support in other countries:
 - Bangladesh - implementing ePhyto
 - Increased regional coordination on mutual recognition across South Asian authorities



UNDERSTANDING RISK?

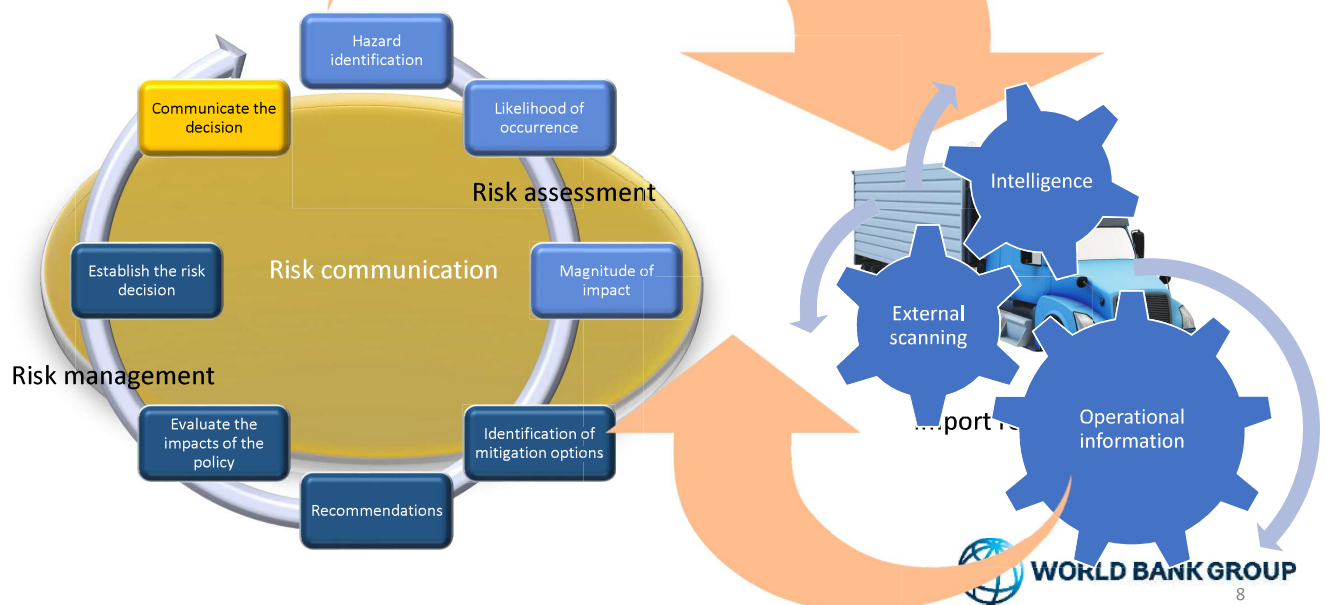


Photo: Steffen A. Frost



7

RISK MANAGEMENT IN THE OPERATIONAL CONTEXT



| Risk Level | Current intervention strategy | Compliance-based risk management <ul style="list-style-type: none"> • Compliance data informs categorization of risk • Education and outreach to advance compliance |
|------------|--|--|
| Low | <ul style="list-style-type: none"> • Licensing/ permitting applies across all risks • Uncoordinated border inspections – maybe independently • Poor differentiation of risk • Compliance data used sparingly • Market surveillance used sparingly | <ul style="list-style-type: none"> • Reduced licensing/permitting • Border inspections limited to areas of non-compliance <ul style="list-style-type: none"> • Increased levels of non-compliance trigger reassessment of both pre-entry controls as well as border interventions • Market surveillance |
| Medium | | <ul style="list-style-type: none"> • Licensing/permitting • Border clearance focused on documentary assessments • Coordinated border inspections on audit basis which may include sampling and testing <ul style="list-style-type: none"> • Increased levels of non-compliance trigger reassessment of both pre-entry controls as well as border interventions • Market surveillance |
| High | | <ul style="list-style-type: none"> • Licensing/permitting • Coordinated border inspections • Sampling/testing • Market surveillance |



FUTURE

- Increase demand driven support and partnerships.
- Enhance trade efficiency, connectivity and safety in the Asia-Pacific region to contribute to sustainable economic growth and development.



In partnership with:



Ministry of Foreign Affairs of the
Netherlands

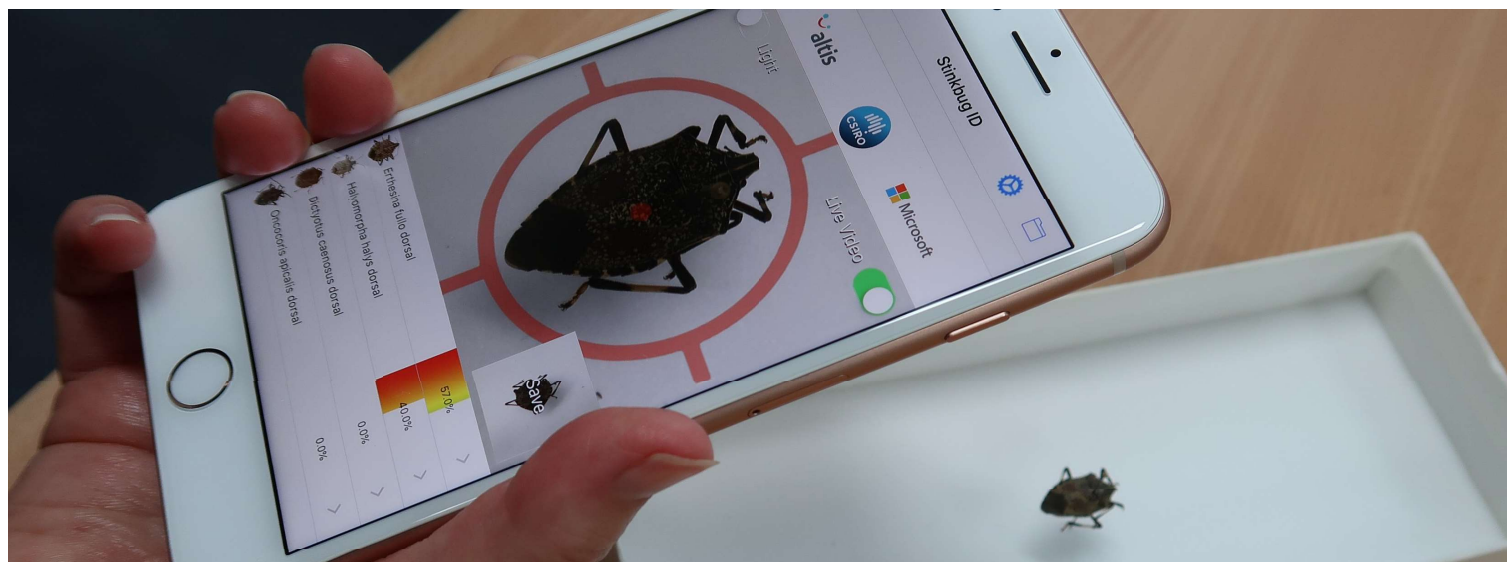


Norwegian Ministry
of Foreign Affairs



USAID
FROM THE AMERICAN PEOPLE





Identification of stink bugs and other biosecurity threats using image classification in smartphone apps

Alexander N. Schmidt-Lebuhn



Australian Government
Department of Agriculture,
Fisheries and Forestry



Identification of biosecurity risks

Increasing incursion risk from trade, travel, transport, etc.

Early detection → less likely to establish

Triage attention of taxonomists

Data capture, reporting → pathway analysis



Mystery seeds intercepted on the way to Macquarie Island

Traditional keys

Dichotomous, single-entry

What if question can't be answered?

Text-based

Need to understand terminology

- hairs shorter than the height of the leaf veins; leaf veins glabrous or puberulous, easily visible 7
- Lower leaflet surfaces woolly, panose, villous, lanose, or strigose, individual hairs recognizable with the unaided eye; leaf veins with similar hairs, often completely obscured by them 13
7. Leaflets 1–4 pairs, membranaceous, sharply serrate; fruits with 2–3 thin wings 8
- Leaflets 1 pair, coriaceous, entire to crenate; fruits with 3–5 hard, irregular ridges 9
8. 2–12 flowers per inflorescence; 1–3 pairs of leaflets; stipular sheaths glandular or hispid; Argentina *P. australis* Bitter
- 14–27 flowers per inflorescence; 2–4 pairs of leaflets; stipular sheaths glabrous or hispid; Bolivia *P. neglecta* M. Kessler
9. Upper leaflet surfaces glabrous, covered by a yellow, glassy resin; leaflets 0.7–1.3 cm long, entire to very slightly crenate; western Cordillera of S Peru, N Chile, and W Bolivia *P. tarapacana* Phil.
- Upper leaflet surfaces without resin, glabrous to slightly pilose; leaflets 0.7–4.0 cm long, crenate; Ecuador to E Bolivia and NW Argentina 10
10. Leaflet apices emarginate; leaflets 1.2–4.0 cm long; Ecuador and Peru *P. incana* Kunth
- Leaflet apices obtuse to acute; leaflets 0.7–2.4 cm long; Bolivia and Argentina 11
11. Plants shrubs, up to 1.5 m tall; leaflets 0.7–1.2 cm long, with 5–6 teeth per side; inflorescences up to 1.8 cm long, lacking glandular hairs; Prov. Arani, Dep. Cochabamba, Bolivia *P. tomentella* Wedd. subsp. *nana* M. Kessler
- Plants shrubs or trees, up to 9 m tall; leaflets 0.8–2.4 cm long, with 5–24 teeth per side; inflorescences up to over 1.2 cm long, with or without glandular hairs; widespread in E Bolivia and NW Argentina 12
12. Leaflets 0.9–2.4 cm long, with 7–24 teeth per side; leaflet apices obtuse to slightly acute; lower leaflet surfaces with or without yellow glandular hairs; upper leaflet surfaces glabrous, rarely very slightly pilose; 4–8 flowers per inflorescence; Dep. Cochabamba, Bolivia *P. tomentella* Wedd. subsp. *incanoides* M. Kessler
- Leaflets 0.8–1.9 cm long, with 5–10 teeth per side; leaflet apices slightly to strongly acute; lower leaflet surfaces always with yellow glandular hairs; upper leaflet surfaces glabrous to pilose; 2–6 flowers per inflorescence; Deps. Potosí, Oruro, Chuquisaca, Tarija in Bolivia, NW Argentina *P. tomentella* Wedd. subsp. *tomentella*
13. Fruits with mostly 3–8 narrow spines; lower leaflet surfaces densely panose or lanose, lacking yellow glandular hairs; leaflet apices emarginate; Colombia to NW Argentina 14
- Fruits with 3–5 irregularly knobby or spiny ridges; lower leaflet surfaces woolly, panose, villous, or strigose, often with yellow glandular hairs; leaflet apices emarginate to acute; Peru and Bolivia 19
14. 6–8 pairs of leaflets; inflorescences 15–35 cm long, with >20 flowers per inflorescence; N Peru *P. multijuga* Pilg.
- 2–6 pairs of leaflets; inflorescences 3–12 cm long, with <20(–24) flowers per inflorescence; Colombia to NW Argentina 15
15. Stipular sheaths and leaflet margins with sericeous hairs contrasting with the panose hairs of the lower leaflet surfaces; 2–3 pairs of leaflets; Ecuador *P. reticulata* Hieron.
- Stipular sheaths and leaflet margins with panose or villous hairs resembling the hairs of the lower leaflet surfaces; 3–6 pairs of leaflets; Colombia to NW Argentina 16
16. Outer surfaces of stipular sheaths with long, sericeous hairs; C Bolivia to NW Argentina *P. hieronymi* Pilg.
- Outer surfaces of stipular sheaths glabrous or with lanose hairs, sometime sericeous hairs emerging from the inner surfaces of the sheaths; Colombia to C Peru 17
17. Upper leaflet surfaces rugose, occasionally with scattered long hairs; stipular sheaths apically obtuse; inflorescences 2.0–5.5 cm long, with 3–7 flowers; fruits with thin, terete spines; Colombia *P. quadrijuga* Bitter
- Upper leaflet surfaces nitid, when young with long, shaggy hairs; stipular sheaths apically with acute spurs; inflorescences 5.5–14.0 cm long, with 8–18 flowers; fruits with flattened spines; Ecuador and Peru 18
18. Lower leaflet surfaces and stipular sheaths villous intermixed with short, matted, dark red multicellular hairs; leaflets 0.4–0.9 cm long, in 4–6 pairs *P. microphylla* (Wedd.) Bitter
- Lower leaflet surfaces and stipular sheaths panose, lacking red hairs; leaflets 0.7–1.6 cm long, in 2–4 pairs *P. weberbaueri* Pilg.
19. Lower leaflet surfaces with shaggy, lanose, long hairs restricted to the veins or much longer there than on the remaining surface; fruits usually with a large distal spine on each ridge 20
- Lower leaflet surfaces with homogeneously distributed, short to long, panose to villous hairs; fruits usually with several spines 22
20. Leaflets 2–3 pairs, apically obtuse to emarginate, marginally entire or with 4–8 teeth per side; inflorescence rachises loosely to

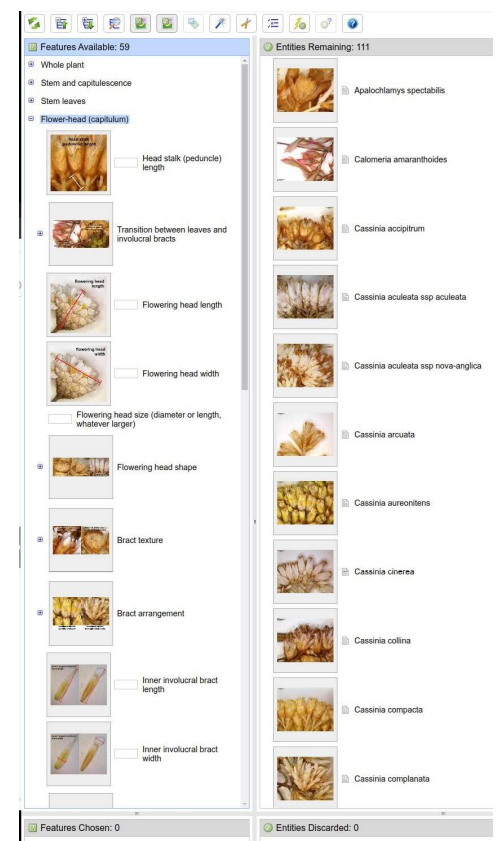
Lucid keys

Synoptic, multi-entry

...but may be overwhelming, especially as more and more species and traits are added

Text-based

Need to understand terminology



Field guides / image collections

Image-based

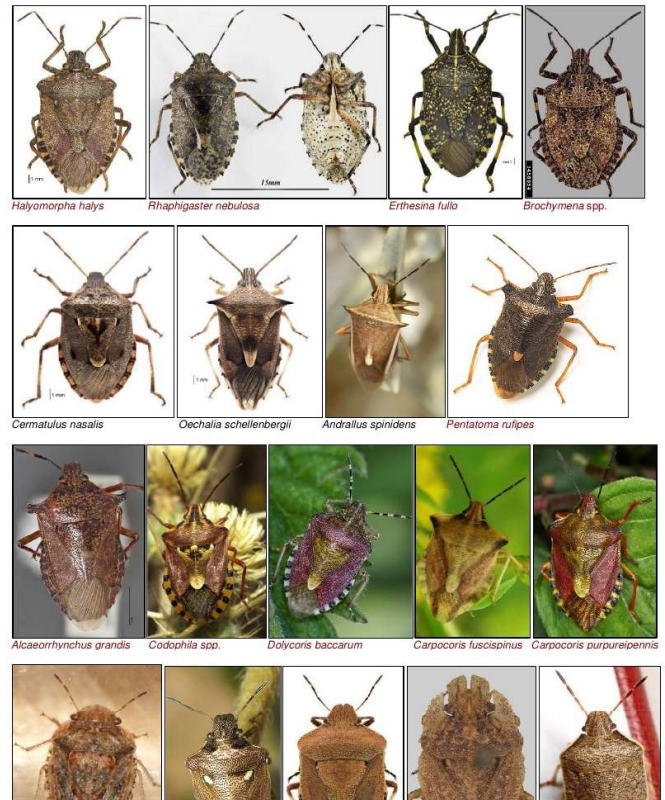
No need to understand terminology

Not suitable for large numbers of species

Already need to know where to start

Maynard A, 2020. *Guide to Pentatomoidea*.

BROWNS/GREYS/DARK



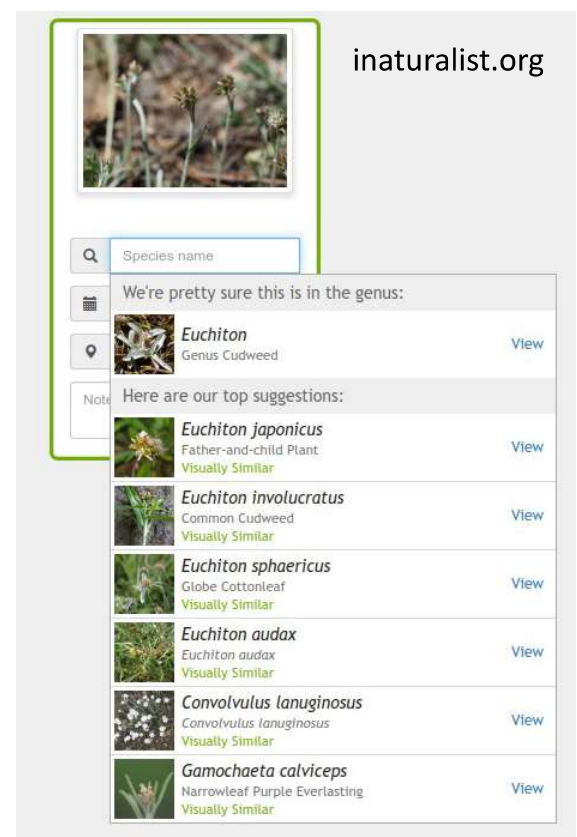
Computer Vision

Machine learning as next-generation identification tool

No technical terminology

Requirements:

- Reliable training images
- Relevant characters accessible to user

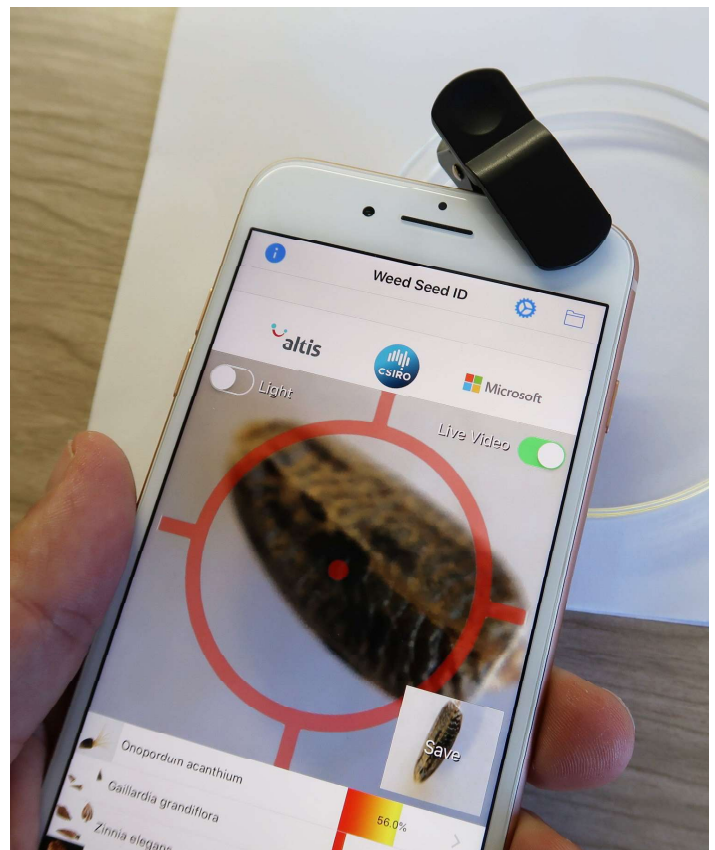


Mobile identification app

iOS prototype 2018

- CSIRO – Microsoft co-investment
- Coded by Altis Consulting

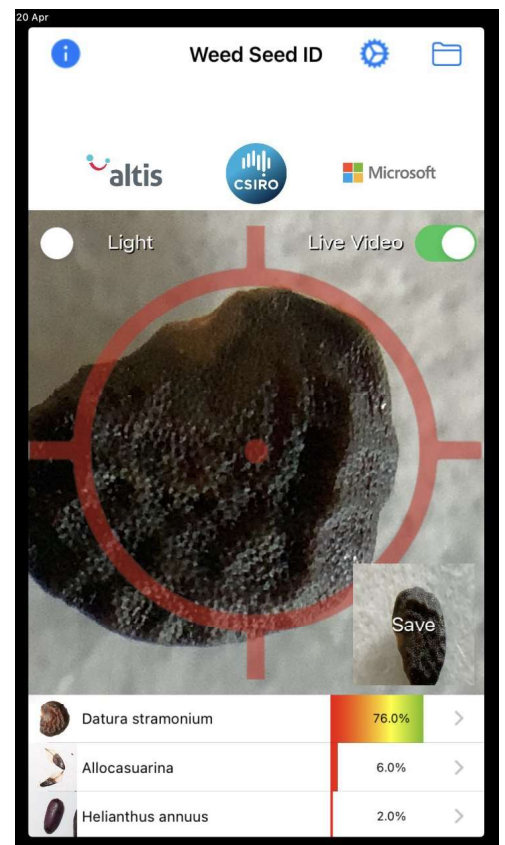
Custom Vision model, 17 species
of weed seeds, works offline



Mobile identification app

Point phone camera at specimen

Get identification suggestions

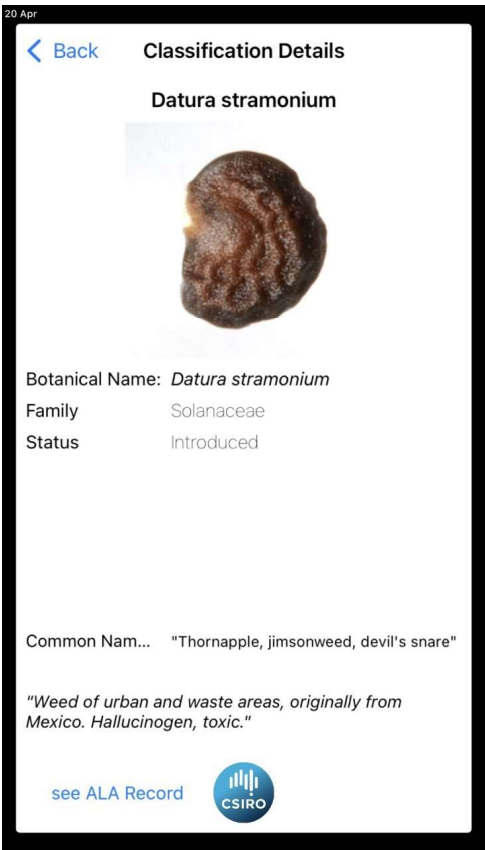
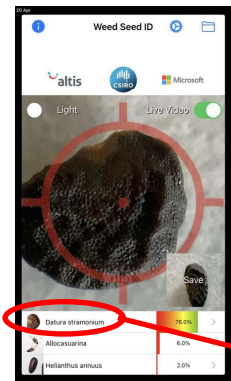


Mobile identification app

Point phone camera at specimen

Get identification suggestions

Tap name to see species profile, compare, check if correct



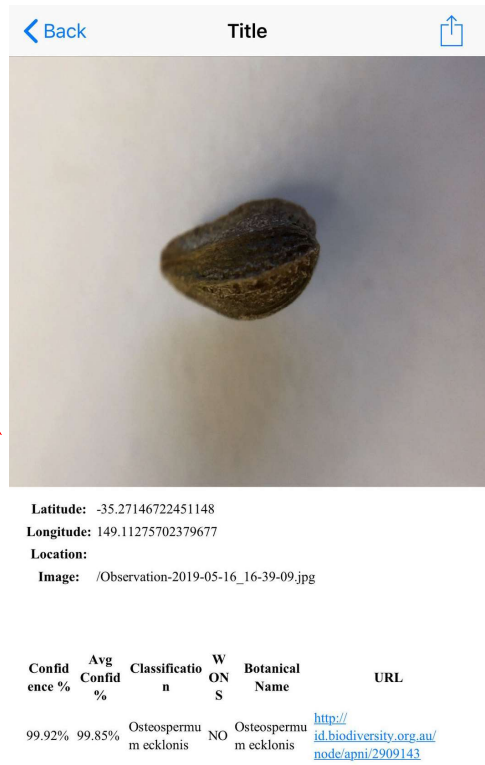
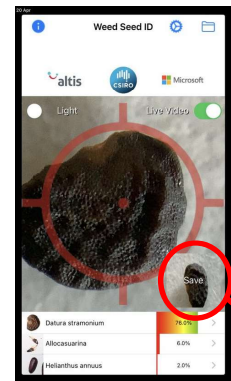
Mobile identification app

Point phone camera at specimen

Get identification suggestions

Tap name to see species profile, compare, check if correct

Back in camera view, tap 'save' to produce record (photo, time, geocode, identification result)



Stink bugs

Brown Marmorated Stink Bug (BMSB) is major biosecurity risk

Eradicated from Sydney area 2019

Feasibility study: mobile identification of BMSB, 2020

Biosecurity Innovation Program,
with Australian Chief Plant
Protection Office

First Stink Bug Model

Australian National Insect Collection
>200 specimens

Inter-institutional loans
>510 specimens

Stack-shot photography

Custom Vision model
Dorsal and ventral as separate classes



Article | [Open Access](#) | Published: 29 August 2017

Global invasion network of the brown marmorated stink bug, *Halyomorpha halys*

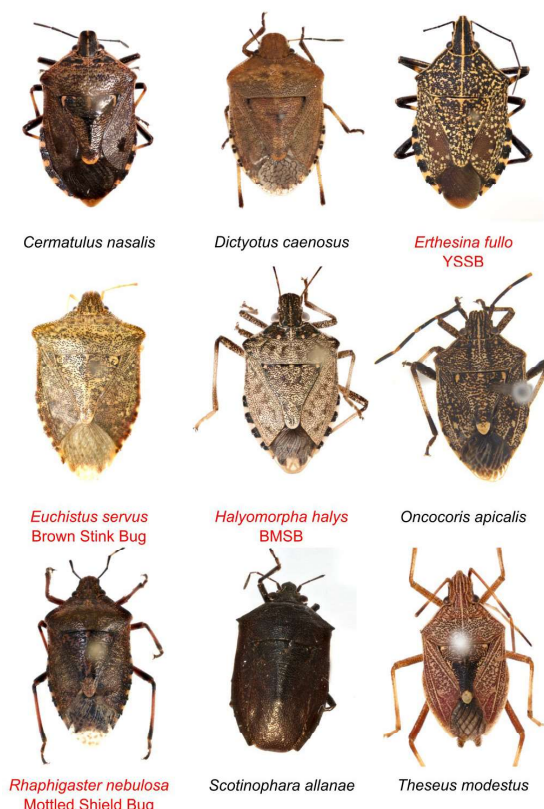
Rafael E. Valentin , Anne L. Nielsen, Nik G. Wiman, Doo-Hyung Lee & Dina M. Fonseca



Results

App against specimens, dorsal:

| Taxon | n | Correct | Wrong | ? | False pos. |
|-----------------------|----|---------|-------|-----|------------|
| <i>Cermatulus</i> | 19 | 26% | 43% | 31% | - |
| <i>Dictyotus</i> | 13 | 100% | - | - | 11 |
| <i>Erthesina</i> * | 14 | 100% | - | - | 1 |
| <i>Euschistus</i> * | 10 | 80% | 10% | 10% | 2 |
| <i>Halyomorpha</i> * | 22 | 100% | - | - | 1 |
| <i>Oncocoris</i> | 22 | 18% | 27% | 55% | - |
| <i>Rhaphigaster</i> * | 7 | 100% | - | - | 4 |
| <i>Scotinophara</i> | 6 | 100% | - | - | - |
| <i>Theseus</i> | 25 | 100% | - | - | - |
| <i>S. coarctata</i> | 14 | NA | 36% | 64% | NA |



Biosecurity Innovation Program project 2021/22

Expanded to 45 stink bug species

>11,500 stackshot photos

>95% precision and recall in training, but mixed results for 15 species in bench test

App source code licensed to DAFF

User experience testing and feedback on app at DAFF



Biosecurity Innovation Program project 2022/23

Imaging and model weed seeds

17,324 photos of 71 species

= 37,815 individual seed images after
cropping

Image classifier for 68 species:
98.5% precision, 98.1% recall

DAFF & DCCEEW begin app development



WeedScan app

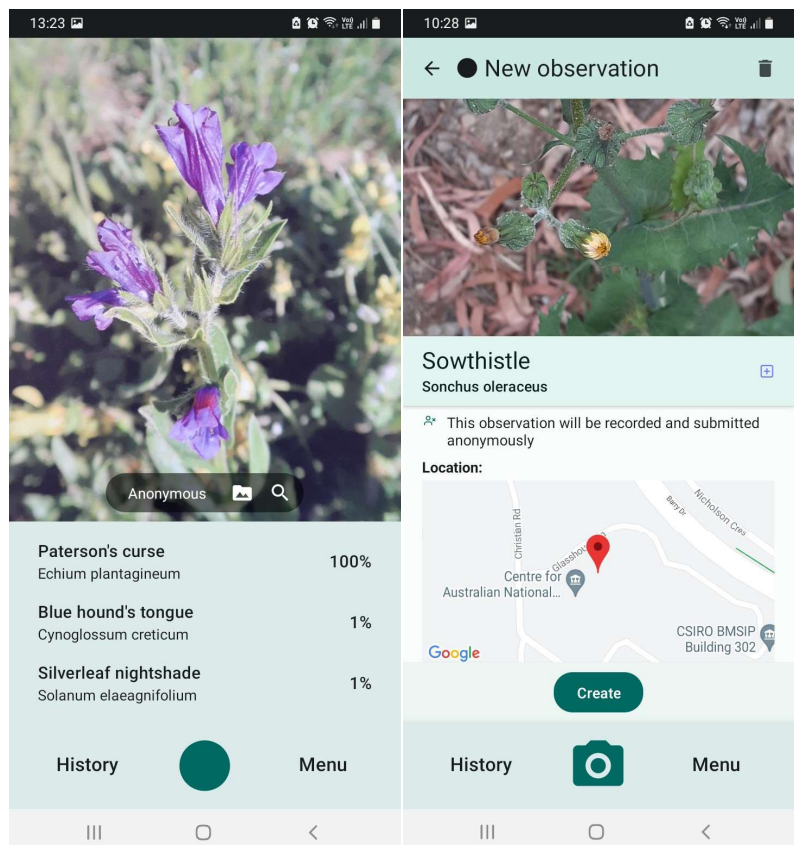
First national identification and
reporting app for priority weed
species

National Landcare Program,
Centre for Invasive Species Solutions,
CSIRO, NSW DPI

iOS



Android

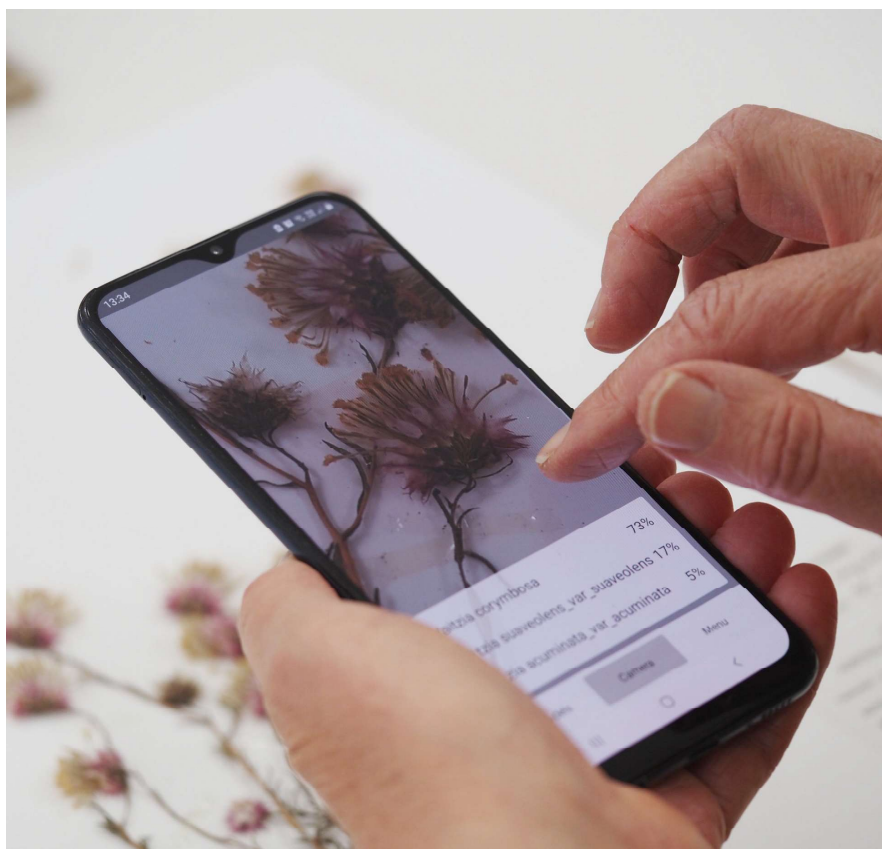


Horama ID

Enable taxonomists to
deploy models to end users

Internally funded by CSIRO,
coded by 2pi Software

Android (iOS under dev.)



Acknowledgements

Biosecurity Innovation Program project team members:

Michael Elias • Olivia Evangelista do Souza • Nicole Fisher •
Nunzio Knerr • Callum Lawler • Juanita Rodriguez Arrieta

NRCA imaging team members:

Bavleen Surinder Singh • Shilpa Nandyal • Noreen Tasleem •
Nathalie Tees • Pete Tybell • David Yuan

Funding:

DAFF Biosecurity Innovation Program • CSIRO •
First app prototype co-funded by Microsoft



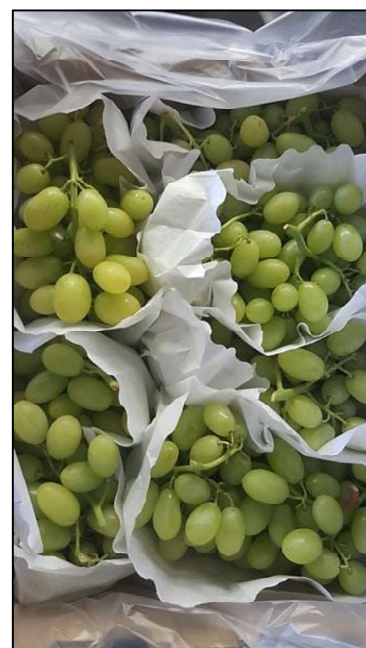


Collaboration to reduce barriers for adopting alternative treatments

Ken Glassey

High level of efficacy data needed

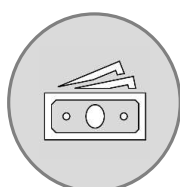
- There's a need for more specific data on the level of control needed for different quarantine pests on different pathways and commodities using alternatives
- Probit 9 efficacy is excessive in most cases
- Commercial pathways are not usually highly infested
- Regulatory decisions on efficacy levels need to be made early in the process
- More research is needed



Small volume use hurts adoption



THE LIMITED USE FOR SOME ALTERNATIVES, ESPECIALLY FOR QUARANTINE APPLICATIONS



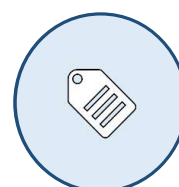
LESS ECONOMICALLY VIABLE, AND ARE NOT READILY AVAILABLE



ENCOURAGE COMPANIES TO SUPPORT THE QUARANTINE CAUSE



GAIN INDUSTRY ASSOCIATION SUPPORT



PROMOTE ABILITY TO "OFF LABEL" USE FOR QUARANTINE PURPOSES ONLY

Registration delays and cost hinder alternatives

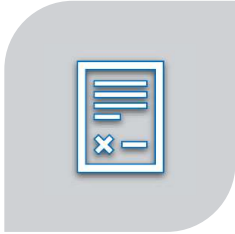
Some alternative treatments are not registered in various countries

Registration process can be lengthy, expensive, and complex, hindering their adoption

Encourage and support the process with positive submissions

Being the registrant may be an option

Approvals can be time-consuming



LOCAL PERMITS, PUBLIC APPROVALS, AND TRADE PARTNER AGREEMENTS ARE ALL NECESSARY STEPS FOR NEW TREATMENTS



PARTICIPATE IN THE PROCESS



HAVE A PLAN THAT INCLUDES ALL THE STEPS

Consumer resistance slows adoption

Consumer or importer resistance or hesitation to switch from established methods can slow the adoption of alternatives



Building confidence might require trials, demonstrations, and information exchange about the new options

Residues and commodity damage can be of concern

Residues from treatments and potential phytotoxicity (plant harm) are ongoing concerns

It's a delicate balance between treating the pest and not damaging the commodity or excessive residues

Only use enough to do the job not the upper limit



Training maybe necessary

- Training on safe handling, residue management, and other important aspects is essential for those using alternative treatments
- Stewardship programmes can work well
- If not applied correctly the alternative treatment gets a bad reputation

Qualified and viable treatment providers

1

Providers need to be officially approved for quarantine treatments

2

The business needs to be commercially viable

3

Able to effectively and efficiently apply the treatment reliably



Treatment time can be critical

- The time taken for the treatment process can be crucial particularly for imported products,
- Delays can affect quality or marketability
- Affects cost
- Needs to fit into the supply chain smoothly or be adapted

Safety with new products

- Consumer, inspector and provider safety is important
- Addressing these concerns is part of the process



Trade barrier

- Treatments on exported goods usually need the importing countries approval
- Collect and supply the correct data
- Have a plan for engagement
- Be persistent!



Summary

- The regulatory and commercial environment is making it hard to adopt alternative treatments.
- Our expectations around treatment efficacy both ourselves and other countries is higher and can be a barrier
- Less world-wide research capacity for biosecurity treatment research
- However, there are some good prospects such as EDN, ethyl formate, controlled atmospheres, heat and cold.
- The biosecurity community needs to work together cooperatively





PLANT PROTECTION DEPARTMENT

Plant Quarantine System and Import Export Phytosanitary Inspection Procedures in Viet Nam

Nguyen Tuan Anh
Plant Quarantine Division



OUTLINE



Introduction



Plant quarantine regulations



Import Phytosanitary Inspection Procedures



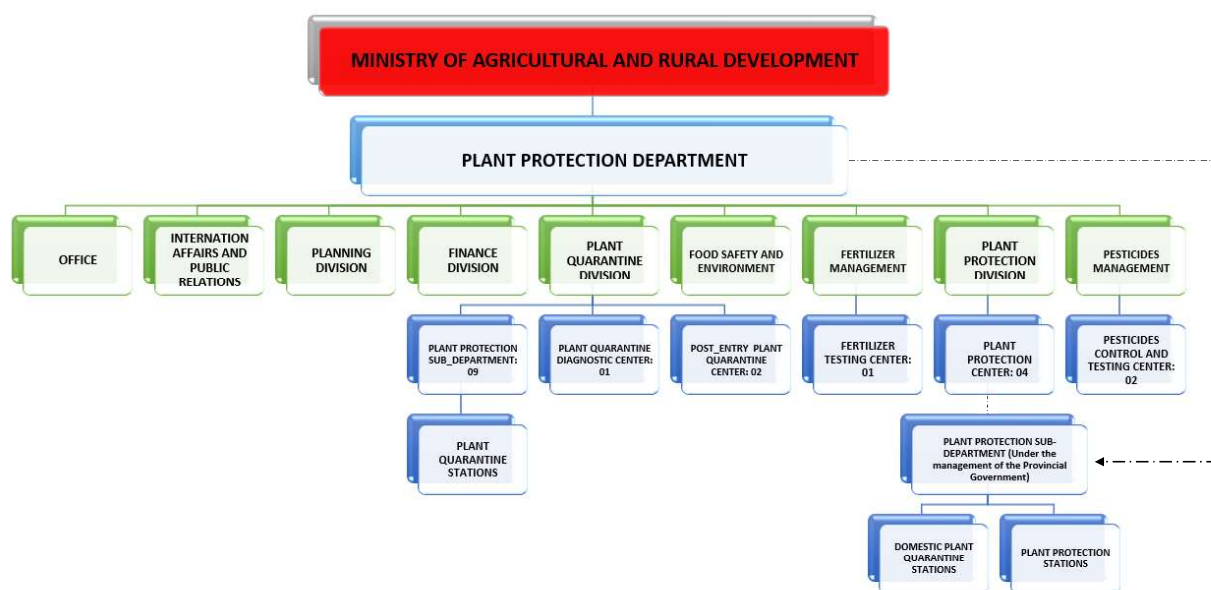
Export Phytosanitary Inspection Procedures



- **Plant Protection Department**

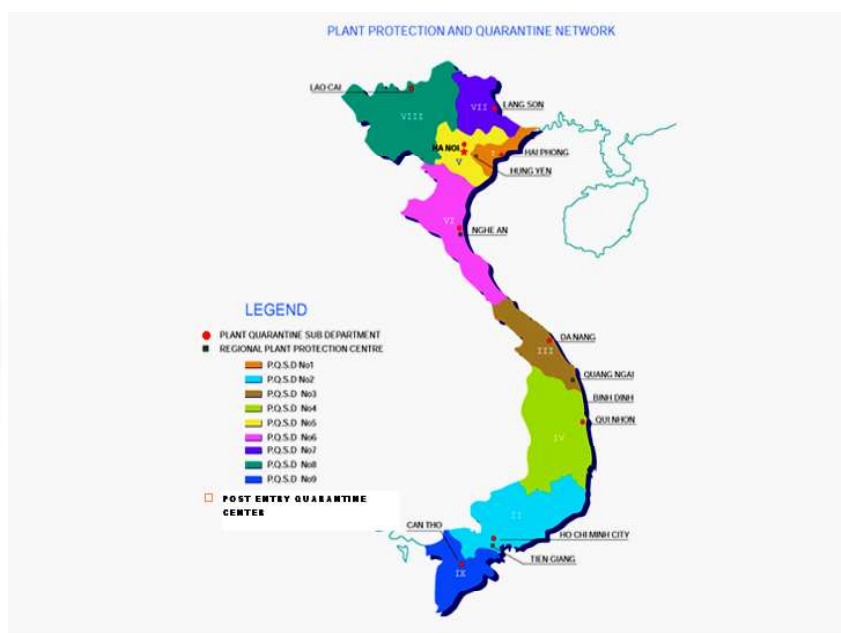
- ❖ Established in 1961
- ❖ PPD is a state management agency under the Ministry of Agriculture and Rural Development (MARD)
- ❖ NPPO of Vietnam
- ❖ Employs around 700 staffs working in:
 - Plant protection and quarantine,
 - Fertilizer and pesticide management,
 - Food safety management of plant products
 - Technical market access

Organizational Chart



----- Instruction on plant protection and domestic plant quarantine

Plant quarantine sub-Departments: 09
 Plant quarantine stations: 32
 Border gates: more than 70
 Plant Quarantine Diagnostic Center: 01
 Post Entry Plant Quarantine Center: 02



Plant quarantine regulations

- **Requirements for regulated articles**
 - ▣ Article 26, Article 27 of Law on Plant Protection and Quarantine
 - ▣ Decree 116/2014/ND-CP detailing some articles of the Law on Plant Protection and Quarantine
 - ▣ Circular No. 30/2014/TT-BNNPTNT publishing the list of regulated articles; list of regulated articles subject to pest risk analysis before importing into Vietnam
 - ▣ Circular No. 11/2021/TT-BNNPTNT HS code for the list of goods under the state management authority of the Ministry of Agriculture and Rural Development and the list of import and export goods subject to specialized inspection in the field of agriculture and rural development
- **Pest Risk Analysis Procedure**
 - ▣ Circular No. 36/2014/TT-BNNPTNT: Regulation on Pest Risk Analysis (PRA) Procedures for regulated articles subject to PRA before being imported into Vietnam
- **Procedures for the plant quarantine for import, export, transit and post-entry of regulated articles**
 - ▣ Circular No. 33/2014/TT-BNNPTNT
 - ▣ Circular No. 15/2021/TT-BNNPTNT amendments and supplements to several Articles of the Circular No. 33/2014/TT-BNNPTNT

List of regulated articles subject to plant quarantine of Vietnam

(Article 1 Circular No. 30/2014/TT-BNNPTNT)



List of regulated articles subject to pest risk analysis before importing into Vietnam

(Article 2 Circular No. 30/2014/TT-BNNPTNT)

1. Living plants and living part(s);
2. Fresh tubers/bulbs, fresh fruits;
3. Grass, and grass seeds.
4. Beneficial organisms used in plant protection
5. The imported commodities that recorded interception of quarantine pest of Vietnam.
6. Articles with high risks of carrying any regulated pests of Vietnam determined by the Plant Protection Department and reported to Minister for decision



Pest Risk Analysis Procedure

- ❑ Circular No: 36/2014/TT-BNNPTNT: Regulation on Pest Risk Analysis (PRA) Procedures for regulated articles subject to Pest Risk Analysis before being imported into Vietnam
- ❑ Phytosanitary import requirements will be developed based on the results of the PRA reports
- ❑ Issuing Phytosanitary import permit



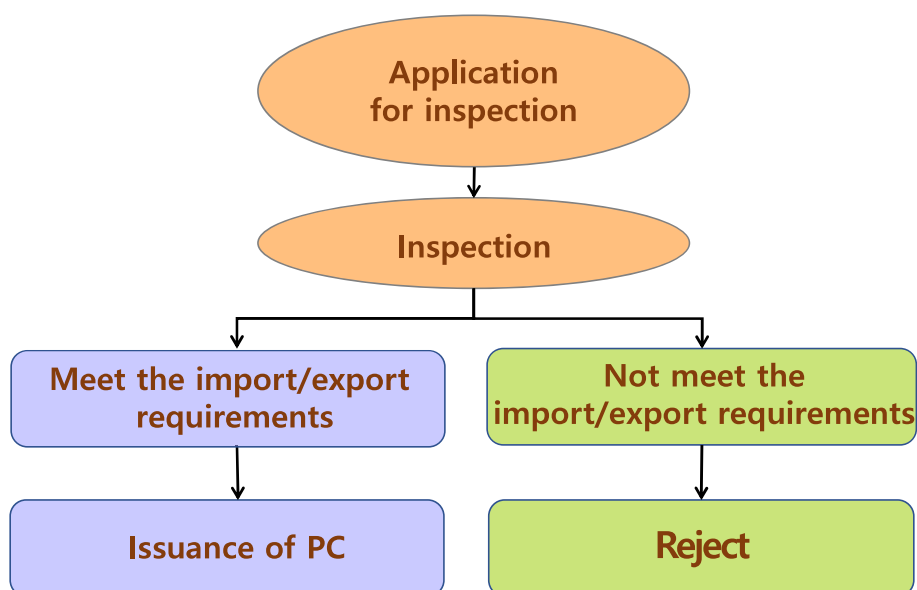
Import Export Phytosanitary Inspection Procedures in Viet Nam

- Circular No. 33/2014/TT-BNNPTNT dated 30/10/2014

Providing procedures for plant quarantine upon import, export and transit and post-import quarantine of regulated articles



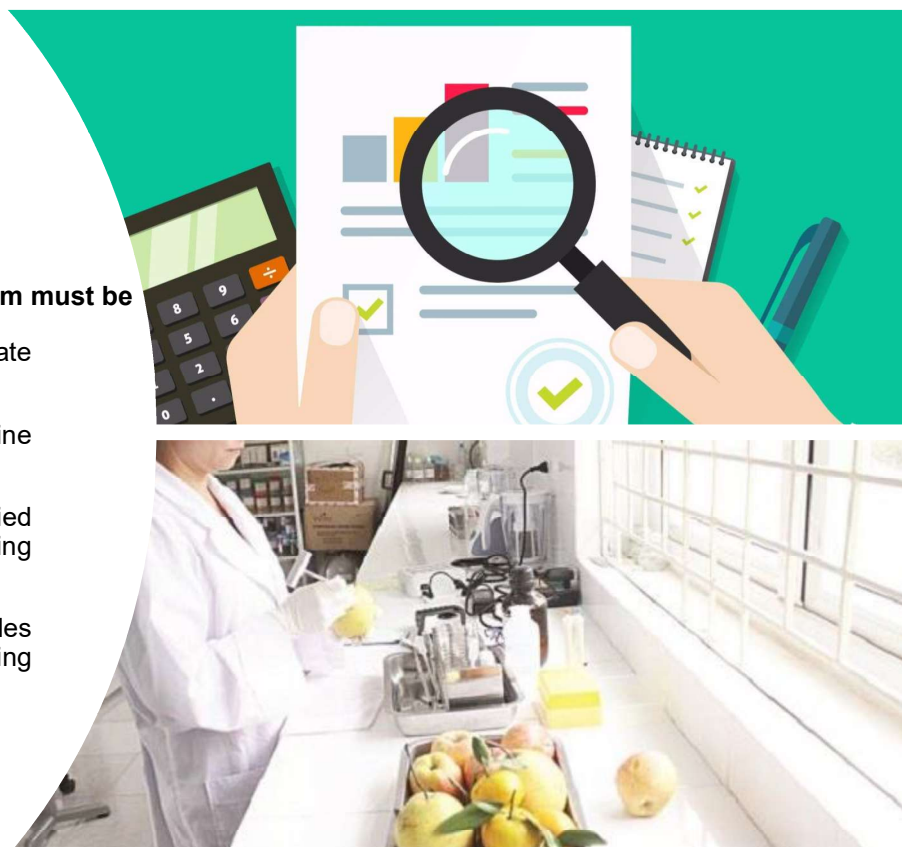
Inspection Procedure



Import Phytosanitary Inspection Procedures

Consignments before importing into Viet Nam must be

- Accompanied with a phytosanitary certificate issued by the NPPO of exporting country;
- Inspected and found free from quarantine pests of Viet Nam and unknown pests;
- Wood packaging materials should be complied with ISPM 15 (Regulation of wood packaging material in international trade);
- Issued import permit for regulated articles subject to pest risk analysis before importing into Vietnam



Import Phytosanitary Inspection Procedures in Viet Nam

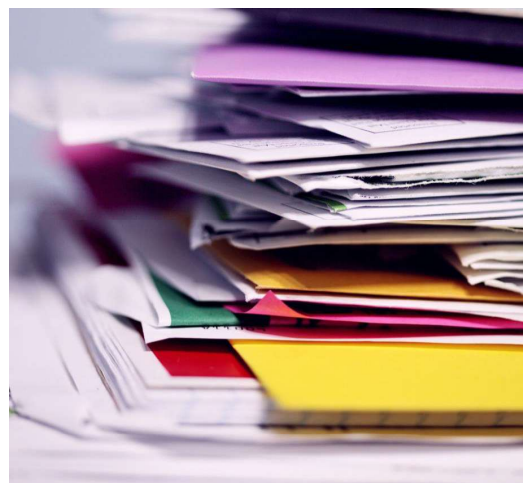
Article 6. Dossier of registration for plant quarantine upon import

1. An application form for plant quarantine (made according to the form provided in Appendix I to Circular No. 33/2014/TT-BNNPTNT).

2. A copy or an original of the Phytosanitary Certificate issued by a competent plant quarantine body of the exporting country.

If the applicant submits the copy, the original must be submitted before the consignment is issued with the Phytosanitary Certificate for import, transit and inland transport.

3. The permit for plant quarantine upon import or a certified copy of such permit (in case an import permit is required).



Import Phytosanitary Inspection Procedures in Viet Nam

Article 7. Procedures for plant quarantine upon import

1. Application for plant quarantine

The applicant shall submit directly 01 application for quarantine of imported plants to a plant quarantine body.

2. Receipt and examination of application

Plant quarantine sub-departments are responsible for receiving and examining the conformity of the application according to the regulation. If the application is not satisfactory, the quarantine body shall request the applicant to complete the application

Import Phytosanitary Inspection Procedures

Article 7. Procedures for plant quarantine upon import (cont.)

3. Inspection on regulated articles

Based on the result of the examination of the application, the plant quarantine sub-department shall decide the location and appoint officials to inspect the consignment in the following order:

Preliminary inspection: The inspection officials shall examine the outside of the consignment, the package, means of conveyance; examine chinks and crevices where pests may hide; collect the insects that move around or stick on the consignment

Detailed inspection: The inspection officials shall examine the inside of the consignment and collect samples according to QCVN 01-141:2013/BNNPTNT National technical regulation on methods of sampling; collect the articles presenting the symptoms of disease and pests; analyze the collected samples and pests

Import Phytosanitary Inspection Procedures

4. Issuance of Phytosanitary Certificates

If the consignment is considered to be free from the quarantine pests, pests subject to control in Vietnam or alien pests, plant quarantine bodies shall issue the Phytosanitary Certificate for import, transit and inland transport (according to Annex II enclosed herewith) within 24 hours from the beginning of the quarantine

** If the issuance duration exceeds 24 hours due to the technical requirements or if the application for Phytosanitary Certificate is rejected, the quarantine body shall notify the applicant or make a written response providing the explanation.*



Import Phytosanitary Inspection Procedures in Viet Nam

b) If the consignment is found infected with quarantine pests, pests subject to control in Vietnam or alien pests, the plant quarantine body shall decide the suitable handling measures according to the regulation



Export Phytosanitary Inspection Procedures

*Law on plant protection and quarantine
No. 41/2013/QH13*

Article 31. Plant quarantine for exported regulated articles

1. Regulated articles before being exported must undergo the plant quarantine and must apply for the issuance of the phytosanitary certificate.

2. The plant quarantine agency must carry out the plant quarantine and issue the phytosanitary certificate as stipulated by Vietnam laws and required by importing countries.



Export Phytosanitary Inspection Procedures

Circular No. 33/2014/TT-BNNPTNT

Article 9. Dossier of registration for plant quarantine upon export

- An application form for quarantine of exported or re-exported regulated articles
- The original of the Phytosanitary Certificate of the exporting country (with regard to the re-export).



Export Phytosanitary Inspection Procedures in Viet Nam

1. Application for plant quarantine

The applicant shall submit directly 01 application to the nearest plant quarantine station.

2. Receipt and examination of the application

Plant quarantine official are responsible for receiving and examining the conformity of the application according to phytosanitary regulations of Vietnam and phytosanitary import requirements of importing countries.

3. Examination on the regulated articles

Based on the examination on the application, the plant quarantine official decide the place for physical quarantine at the manufacturer, the export place, checkpoint of export and promptly appoint officials to examine the consignment.

The examination on the consignment is performed according to phytosanitary regulations of Vietnam and phytosanitary import requirements of importing countries.

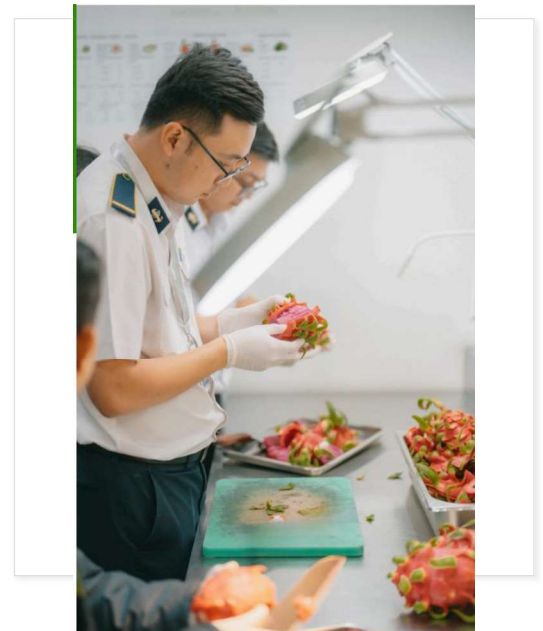
Export Phytosanitary Inspection Procedures in Viet Nam

4. Issuance of Phytosanitary Certificate

a) If the consignment satisfies the plant quarantine requirements of the importing countries, the plant quarantine official shall issue such consignment with the Phytosanitary Certificate or the Phytosanitary Certificate for re-export within 24 hours from the beginning of quarantine inspection.

If the issuance duration exceeds 24 hours due to the technical requirements, the quarantine official shall notify the applicant or make a written response providing the explanation.

b) If the consignment is considered unconformable with the plant quarantine requirements of the importing countries, the plant quarantine official shall refuse to issue the Phytosanitary Certificate and notify the applicant.




Export Phytosanitary Inspection Procedures in Viet Nam

- **Phytosanitary Certificate**

sample

| | | |
|---|--|---|
| BỘ NÔNG NGHIỆP & PHÁT TRIỂN THÔN NÔNG NGHIỆP MINISTRY OF AGRICULTURE & RURAL DEVELOPMENT TỤC KHẨU VÀ THỰC VẬT PLANT PROTECTION SERVICES | CÔNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM SOCIALIST REPUBLIC OF VIETNAM Năm lập - Year of Establishment HỒ SƠ VÀ CHỨNG NHẬN ĐIỀU CHỈNH RECORD AND CERTIFICATE OF ADJUSTMENT |  |
| GIẤY CHỨNG NHẬN KIỂM DỊCH THỰC VẬT PHYTOSANITARY CERTIFICATE | | |
| Gửi: Cơ quan Bảo vệ thực vật nước TO: The Phytosanitary Organization of | | |
| ĐƠN GIẤY VÀO HÀNG (DESCRIPTION OF CONSIGNMENT) | | |
| 1. Tên và chỉ người xuất khẩu: NAME AND ADDRESS OF THE EXPORTER: | 5. Nơi xuất xứ: PLACE OF ORIGIN: | |
| 2. Tên và chỉ người nhập khẩu: DECLARATION MADE AND ADDRESS OF THE IMPORTER: | 6. Phạm vi chứng nhận: DECLARED AREAS OF COVERAGE: | |
| 3. Số hàng và loại hàng hi: NUMBER AND DESCRIPTION OF PACKAGES: | 7. Chức năng, giá trị: DECLARATION OF INTENT: | |
| 4. Nơi xuất xứ: PLACE OF ORIGIN: | 8. Tên và khối lượng các phần: NAME OF PRODUCTS AND QUANTITIES DECLARED: | |
| 9. Tên và chỉ người nhập khẩu: NAME AND ADDRESS OF THE IMPORTER: | 10. Tên và chỉ người xuất khẩu: NAME AND ADDRESS OF THE EXPORTER: | |
| <p> Tôi chứng thực rằng: các phần trên đây hoặc với các giấy tờ khác được đính kèm, các tài liệu khác kèm theo được trình bày đúng và đầy đủ các yêu cầu của pháp luật Việt Nam và các quy định khác của pháp luật có liên quan. Tôi xin cam đoan rằng: các phần trên đây hoặc với các giấy tờ khác được đính kèm theo đúng và đầy đủ các yêu cầu của pháp luật Việt Nam và các quy định khác của pháp luật có liên quan. </p> <p> I hereby certify that: the parts above or with other documents attached hereto, the other documents attached hereto are presented in accordance with the requirements of the law of the Socialist Republic of Vietnam and other relevant regulations. I declare that: the parts above or with other documents attached hereto are presented in accordance with the requirements of the law of the Socialist Republic of Vietnam and other relevant regulations. </p> <p style="text-align: center;">KHAI BÁO BỔ SUNG (ADDITIONAL DECLARATION)</p> | | |
| XUẤT (DISSEMINATION AND / OR DISCONTINUATION STATEMENT) | | |
| 11. Ngày xuất: DATE OF EXPORT: | 12. Tên thuốc diệt trừ: PESTICIDE, NAME OF PESTICIDE: | 13. Tên thuốc diệt trừ: PESTICIDE, NAME OF PESTICIDE: |
| 14. Phương pháp xử lý (nếu có): METHOD OF TREATMENT (IF ANY): | 15. Ngày đi (nếu có): DATE OF DEPARTURE (IF ANY): | 16. Tên và chỉ người nhập khẩu: NAME AND ADDRESS OF THE IMPORTER: |
| 17. Tên và chỉ người xuất khẩu: NAME AND ADDRESS OF THE EXPORTER: | 18. Tên và chỉ người nhập khẩu: NAME AND ADDRESS OF THE IMPORTER: | 19. Tên và chỉ người nhập khẩu: NAME AND ADDRESS OF THE IMPORTER: |
| <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: center;"> <p> Tôi xin cam đoan và xác nhận rằng: Giấy chứng nhận này và các tài liệu khác kèm theo được trình bày đúng và đầy đủ các yêu cầu của pháp luật Việt Nam và các quy định khác của pháp luật có liên quan. </p> <p> I hereby certify and confirm that: this certificate and other documents attached to it are presented in accordance with the requirements of the law of the Socialist Republic of Vietnam and other relevant regulations. </p> </div>  </div> | | |

| | |
|--|--|
| BỘ NÔNG NGHIỆP VÀ PHÁT TRIỂN NÔNG THÔN MINISTRY OF AGRICULTURE & RURAL DEVELOPMENT CỤC BẢO VỆ THỰC PHẨM PLANT PROTECTION DEPARTMENT | CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM SOCIALIST REPUBLIC OF VIETNAM Độc lập - Tự do - Hạnh phúc Independence - Freedom - Happiness |
|--|--|



GIẤY CHỨNG NHẬN KIỂM ĐỊNH THỰC VẬT XUẤT KHẨU
PHYTOSANITARY CERTIFICATE FOR RE-EXPORT

Gửi: Cơ quan Bảo vệ thực vật nhập
 To: Plant Protection Department of the

Số (No.):

DIỄN GIẢM VẬT LƯỢNG (DESCRIPTION OF COMMODITY)

| | |
|--|--|
| 1. Tên và địa chỉ người xuất khẩu Name and address of the exporter | 8. Nơi sản xuất: Place of origin |
| 2. Tên và địa chỉ người nhập khẩu Name and address of the importer | 9. Phòng kiểm chuyên chở: Declaration board of consignment |
| 3. Số hàng và loại hàng: Number and description of products | 7. Cỗ kiểm chuyên chở: Declared point of entry |
| 4. Kí, mã hiệu: Marking and numbers | 6. Tên khu vực của thực vật: Botanical name of plants |

Ngay chôn nhận thực vật này, và sản phẩm thực vật hoặc vật thuộc diện kiểm định thực vật (KĐTV) nêu trên đã nhập khẩu vào Việt Nam từ nước (This is to certify that the plants, plant products described above were imported into Vietnam from)

[] nước gốc (original) [] bản sau (certified true copy) [] ghi kèm theo giấy chứng nhận gốc (of which is attached to this certificate) thực vật đã được ghi rõ (which are specified) [] đồng gốc (in perpetuity) [] gốc nguyên bản (in original) [] sau khi nhập (new consignment) [] nhập từ tất cả thực vật KĐTV gốc (of which is based on original phytosanitary certificate) [] kết quả kiểm tra bổ sung (and additional inspection) được các cơ quan bảo vệ thực vật của KĐTV nhập khẩu của nước nhập khẩu, và trong thời gian bảo hành của Việt Nam, là hàng này không bị lây nhiễm sâu, virus gây hại hay các bệnh là con trùng để conform with the current phytosanitary requirements of the importing contracting party, and that during storage in Vietnam, the consignment has not been subjected to risk of infection or infection).

KHAI BÁO BỔ SUNG (ADDITIONAL DECLARATION)

XU LÝ DISSEMINATION AND / OR DISINFESTATION TREATMENT

11. Phương pháp xử lý (PHYSICAL)

12. Tên thuốc (thuốc diệt):
 CHEMICAL (pesticide)

13. Thời gian và nhiệt độ:
 DURATION AND TEMPERATURE

14. Thông tin thêm (ADDITIONAL INFORMATION)

15. Dữ liệu cơ quan
 Plant Quarantine

16. Nơi cấp giấy
 PLACE OF

17. Tên, chữ kí và dấu của nhân viên kiểm dịch thực vật
 NAME AND SIGNATURE OF THE PHITosanITARY OFFICER

18. Ngày cấp
 DATE ISSUED

Cơ bản được xử lý hoặc vận chuyển kiểm định thực vật vào Việt Nam hoặc xuất khẩu với mức độ rủi ro thấp nhất cho quốc gia được gửi chứng nhận này
 Basically the consignment is treated or transported for phytosanitary inspection into Vietnam or exported with the lowest possible risk to the importing country

A photograph of a tea plantation with rows of green tea bushes under bright, warm sunlight. The text "THANK YOU FOR YOUR ATTENTION" is centered over the image.

THANK YOU FOR YOUR ATTENTION

WTO Standards and Trade Development Facility (STDF)

Promoting IT Solutions for Pest Surveillance and Reporting in the Asia-Pacific:

<https://standardsfacility.org/PG-432>

Ms Carol Quashie-Williams, STDF PG 432 Project Manager,
Department of Agriculture, Fisheries and Forestry, Australia &
Ms Marjorie Kemoi, STDF Country manager, National Agriculture
Quarantine and Inspection Authority, Papua New Guinea

Structure of Presentation

- **WTO Standards and Trade Development Facility (STDF) Pest Surveillance and Reporting Project**
 - The background of the STDF Project
 - The activities and benefits of the project
 - The project outcomes
 - The recommendations for future action:
 - Alternative surveillance app

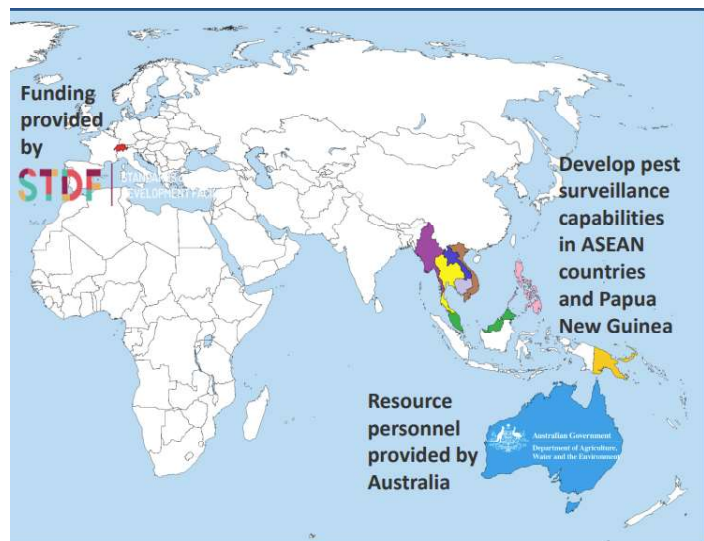
STDF Pest surveillance and reporting project

WTO Standards and Trade Development Facility (STDF) Pest Surveillance and Reporting Project:

Strategic purpose to promote a harmonised approach to performing surveillance in 7 ASEAN countries, Papua New Guinea.

Commenced December 2016

Completion in May 2023
(extended due to COVID travel restrictions).



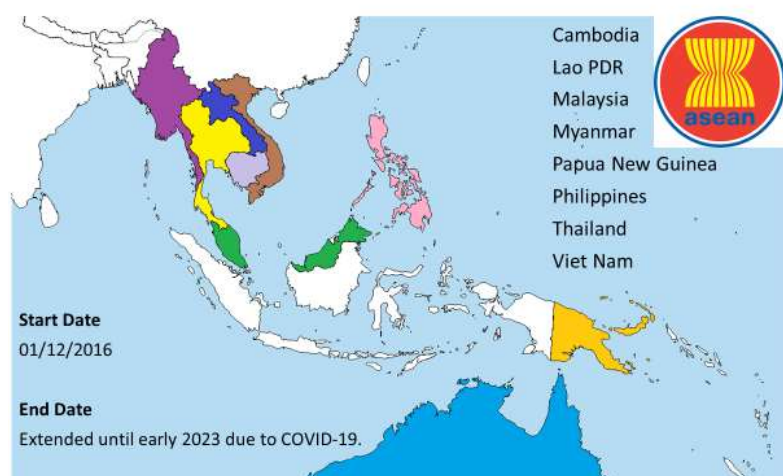
STDF Pest surveillance and reporting project

Objectives:

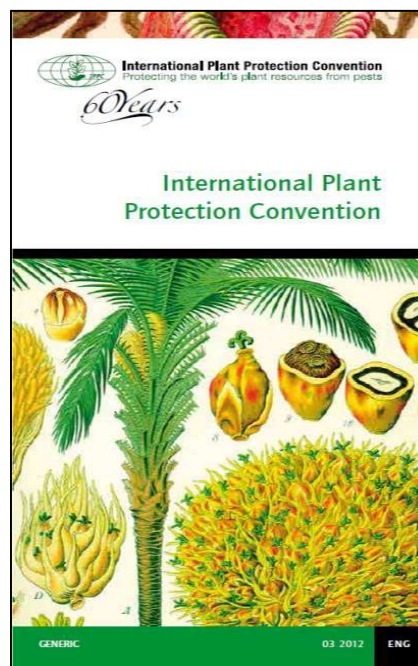
Project to **promote best practice** in;

- **Surveillance** - design, planning and implementation
- Efficient **data collection**
- **Management of surveillance information**, and
- Evidence-based **reporting on pest status**

Beneficiary countries:



STDF Pest surveillance and reporting project - Drivers



STDF Pest surveillance and reporting project - Outcomes

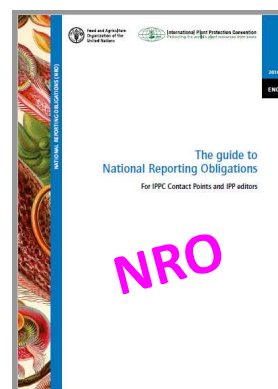
| Commodity | Insect Pests | Diseases |
|-----------|--|--|
| Pineapple | • Mealy bug (<i>Dysmicoccus neobrevipes</i> , <i>Pseudococcus jackbeardsleyi</i>) | • Pineapple mealy bug wilt virus • Bacterial heart rot disease (<i>Dickeya zeae</i>) |
| Papaya | • Fruit fly (<i>Bactrocera dorsalis</i>) • Mealy bug (<i>Paracoccus smarginatus</i>) • Scale insect (<i>Aspidiotus orientalis</i>) | • Papaya ring spot virus • Papaya dieback disease |
| Banana | • Fruit fly (<i>Bactrocera dorsalis</i>) • <i>Cosmopolites sordidus</i> | • Banana blood disease (<i>Ralstonia solanaceae</i> sp. <i>celesensis</i>) • Banana mosaic virus (<i>Banana pseudosolaceum</i> sp. <i>phycis</i>) • <i>Erwinia</i> sp. |
| Jackfruit | • <i>Bactrocera umbrosa</i> | |
| Starfruit | • <i>Bactrocera carinata</i> • <i>Bactrocera dorsalis</i> | |
| Citrus | • <i>Bactrocera dorsalis</i> • <i>Diospyros citri</i> | • Citrus greening disease |
| Mango | • <i>Bactrocera dorsalis</i> • <i>Sternonchus frigidus</i> • <i>Paracoccus endocarpa</i> | • Anthracnose (<i>Colletotrichum gleosporoides</i>) • Stem end rot (<i>Botryodiplodia theobromae</i>) |
| Durian | • <i>Conogethes punctiferalis</i> • <i>Mudaria maniploa</i> | • Patch canker (<i>Phytophthora palmivora</i>) |

Figure

Content
Major insect pests and disease of fruits in Malaysia.

This figure was uploaded by [Nur Adliza Baharom](#)
Content may be subject to copyright.

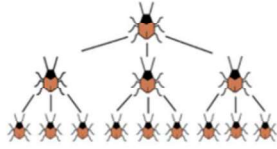
Status and Management of *Conogethes* spp. in Malaysia
A. Sivaprasadarao¹
Email: a.sivaprasadarao@cab-international.org
A. Bodhidhaja²
Email: bodhidhaja@maro.gov.my
M. N. Mahamud Ruff³
Email: mnruff@maro.gov.my
¹ CAB International, Building 419, Malaysian Agricultural Research and Development Institute (MARDI), Seremban, 43400 Seremban, Malaysia
² Malaysian Agricultural Research and Development Institute (MARDI), Seremban, 43400 Seremban, Malaysia
³ Malaysian Agricultural Research and Development Institute (MARDI), Seremban, 43400 Seremban, Malaysia
Abstract
In Malaysia, the fruit fly *Conogethes punctiferalis* is the most important with wide host range. It is a major pest on durian, carambola and other tropical fruits. Fruit thinning and other important practices on single fruits are followed for inspection and finding. This paper highlights the need for insecticide application. Insecticide application is another important measure to suppress the host population. Other measures like entomopathogens and more formulation and incorporation of insecticides like being done
Keywords
Bionomics, *Conogethes*, Durian, Integrated management



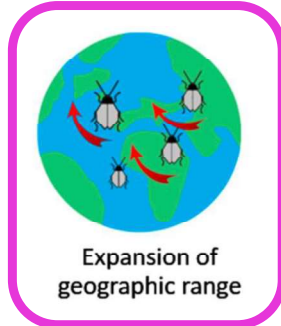
STDF Pest surveillance and reporting project – (Climate Change!)



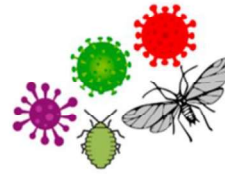
HOW DOES TEMPERATURE INCREASE AFFECTS INSECT PESTS?



Increased number of generations



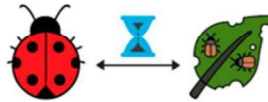
Expansion of geographic range



Outbreak of plant diseases transmitted by insects



Increased overwintering survival



Desynchronization of insects and their natural enemies



Loss of synchrony with the host plant

Source

STDF Pest surveillance and reporting project - Problem



STDF Pest surveillance and reporting project - Problem

| Sr. No. | Name & Address of the Farmer | Date of Visit | Variety | Area in Acres | Date of Sowing | Plant Pop. (per acre) | STDF PEST | | | | | BOLLWORM RE-ESTABLISHMENT | | | | | | | | | | | | CLCV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | Host | Plant | Leaf | Stem | Flower | Pod | Seed | Root | Soil | Other | W | B | S | L | R | RF | Bole | Pod | Acto | CL | CL | CL | CL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | THA. ANIL K. T. N. | | | | | | JAS 200 | 11 | A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |



Different spellings!

- *Bactrocera*
- *Batocera*
- *Batrocera*
- *Fruit fly*

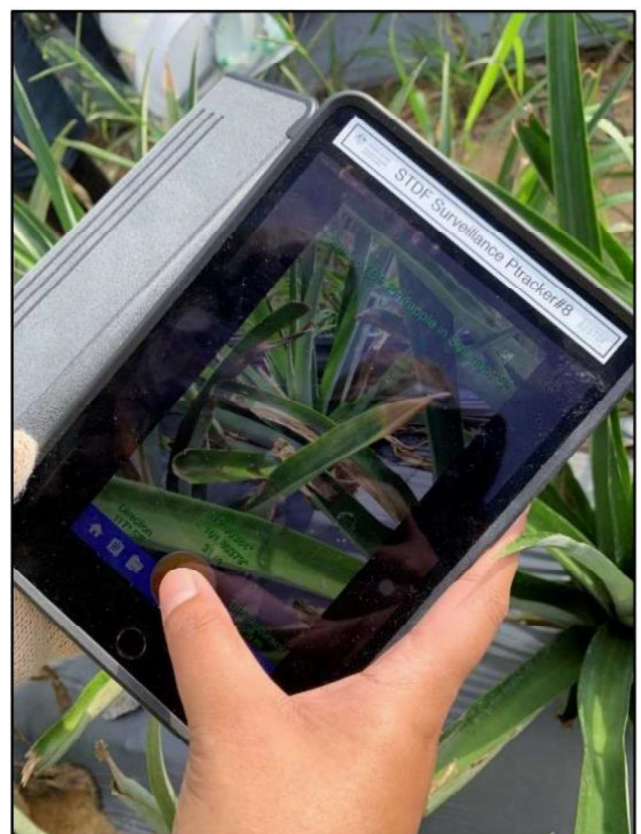


STDF Pest surveillance and reporting project - Solution

Data collection app with a pre-filled form
(Pest or P-Tracker)

Mobile device to collect data in the field

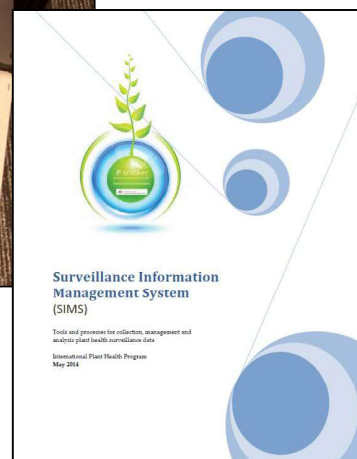
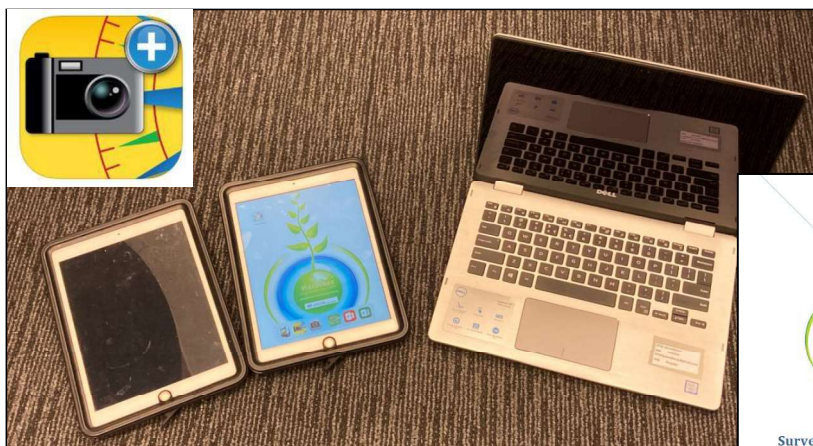
| Pest-tracker (P-tracker) Surveillance Data Collection | | |
|---|--|--|
| Field Name | Pre-Populated Field Values | |
| SurveyID | - Country / Location / Year | |
| CollectionID | - TBC (Collectors Unique Collection Id Code) | |
| CollectionDate | - Date of Record | |
| HostCommon | - Eg. Rubber Tree | |
| HostGenus | - Eg. Hevea | |
| HostSpecies | - Eg. Brasiliensis | |
| PestOrder | - Eg. Capnodiales | |
| PestFamily | - Eg. Mycosphaerellaceae | |
| PestGenus | - Eg. Microcybus | |
| PestSpecies | - Eg. ulei | |
| PestCommonName | - Eg. South American Leaf Blight (SALB) | |
| PestCategory | - Fungus | |
| Location_Level1 | - Country Location / District or Province Location | |
| Location_Level2 | - Immediate Location (Suburb, Town, Village) | |
| Latitude | - GPS coordinate | |
| Longitude | - GPS coordinate | |
| Collector | - Participant Details | |
| CollectionMethod | - Hand Collection - Trapping - Observation | |
| RecordType | Specimen | a physical specimen has been collected |
| DiagnosticResult | Observation: present | visual inspection indicates the pest is present |
| | Observation: absent | visual inspection indicates the pest is absent |
| | Positive | positive diagnostic result for the pest (present) |
| | Negative | negative diagnostic result for the pest (absent) |
| | Unknown | unable to identify the pest |
| | Pending | the result of diagnostics are not yet confirmed/complete |
| Unit | - Individual Plants - Hectare - Square Metre - Transact | |
| NumberInspected | - Total Number of Host Plants Identified | |
| NumberPositive | - Total Number of Host Plants with Pest Positively Identified | |
| IdentificationMethod | - Visual Inspection - Isolation - DNA | |
| IdentificationDate | - Date of Formal Identification | |
| Identifier | - Name of Scientist / Officer Performing Identification | |
| References | - Taxonomic Reference | |
| Notes | - Any additional information of relevance to the record | |



STDF Pest surveillance and reporting project – Resources provided

Hand-held smartphone devices (iPad or iPhone) to record field surveillance data using a data collection app GeoJot+ app;

Laptop with Surveillance Information Management System (SIMS) for importing surveillance data



Surveillance Related Documents

Important ISPMs-Surveillance



Surveillance Manuals Provided



All Resources available on the project iPad



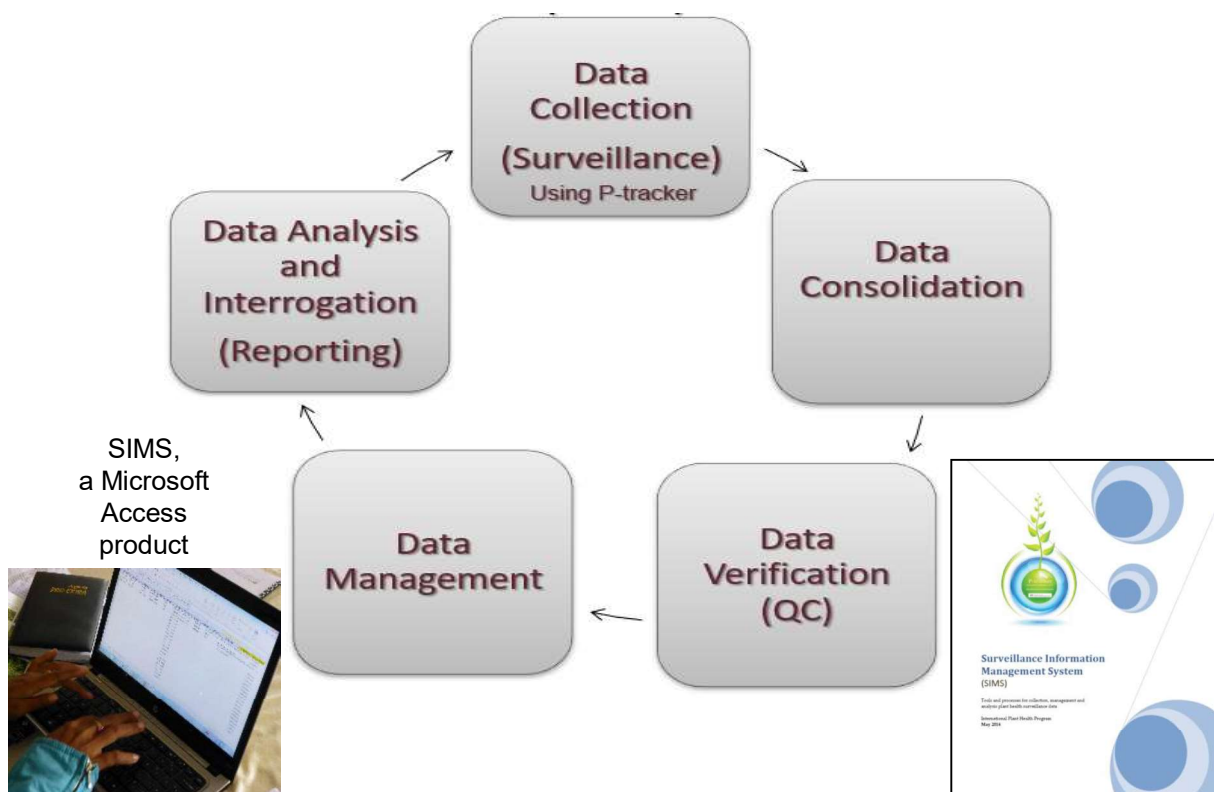
GeoJot+ Field Data Collection App

GeoJot+ license fees provided by project



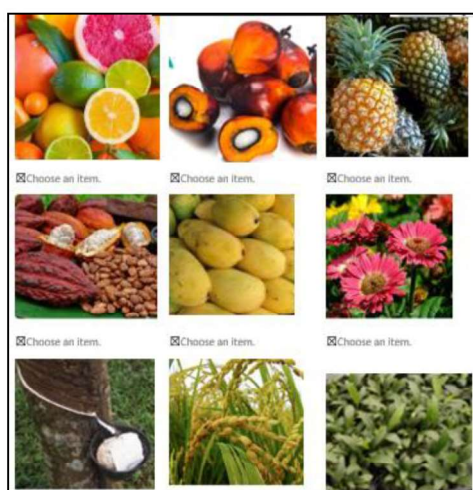
An app that collects GPS, photos and field data and generates reports

Surveillance Information Management System (SIMS)

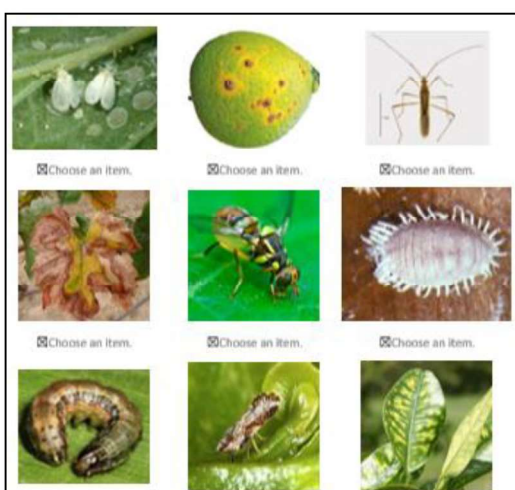


Surveillance Priority Targets Identified

Plant Products



Pests and Diseases



Surveillance protocols and plans developed

Fruit Fly Surveillance Programme (2017-2019)

Section Two
Fruit Fly Surveillance Programme Planning and Prioritization

Surveillance Programme Province, District and Plantation Prioritization
Planning and Coordination discussions within NPPPO Plant Protection and provincial operations and with STDF representative are still in progress (regarding funding, resourcing, reporting and stakeholder engagement requirements). It is anticipated that fruit fly monitoring and surveys will be initially prioritized to the following provinces: Kampong Cham, Kampong Speu and Kampong Som. Surveillance activities will focus on known commercial and large scale plantations. Surveillance activities will focus on monitoring activities, utilizing observational and 'negative' records as the primary surveillance information data source.

| Surveillance Prioritization | Surveillance Pre-Survey | Surveillance Survey Delivery | Surveillance Post-Survey | Surveillance Data and Analysis |
|-------------------------------|--|--|--|--|
| NPPPO Considerations | Kampong Cham, Kampong Speu and Kampong Som | Kampong Cham, Kampong Speu and Kampong Som | Kampong Cham, Kampong Speu and Kampong Som | Kampong Cham, Kampong Speu and Kampong Som |
| STDF Considerations | N/A | N/A | N/A | N/A |
| OTHER Considerations | N/A | N/A | N/A | N/A |
| Foreign Donors Considerations | N/A | N/A | N/A | N/A |
| Industry Considerations | N/A | N/A | N/A | N/A |

• **Specific Plant Pest Surveillance Programme Design**
A fruit fly specific field surveillance operational procedure (programme design) has been developed (in collaboration with NPPPO plant protection and field officers) to assist surveillance officers with the field surveillance and inspections for the two pests. The operational procedure has been developed based on internationally agreed protocols and field testing by the NPPPO and pest surveillance experts during the STDF workshop field activity in February 2017. This operational procedure can be utilised to provide early warning and detection, and monitor changes in pest, severity and spread.

• **Fruit Fly Response, Delimiting and Trace Back Surveillance**
The specific field surveillance operational procedures for these pests have been developed (in collaboration with NPPPO plant protection and field officers) to assist NPPPO Officers with the field surveillance of plantations and inspections for the two pests. These operational procedures (along with the pest surveillance data collection form information) can be utilised to provide early detection, early warning, response, delimiting and trace back surveillance and assist monitor changes in pest severity and spread.

Date Published: 18 September 2017 Version Number: 2.0 Page: 5 of 9

Fruit fly of mango symptoms:

Adult fruit flies damage the fruit where they lay their eggs causing blemishes and discoloration. The maggots bore into the fruit, develop inside and pave the way for secondary invaders (fungi or bacteria), which cause extensive rotting and dropping of fruit. Damaged fruits are unfit for human consumption. Damage symptoms do not vary on different crops.

Fig 1: Effect of fruit fly to mango fruit

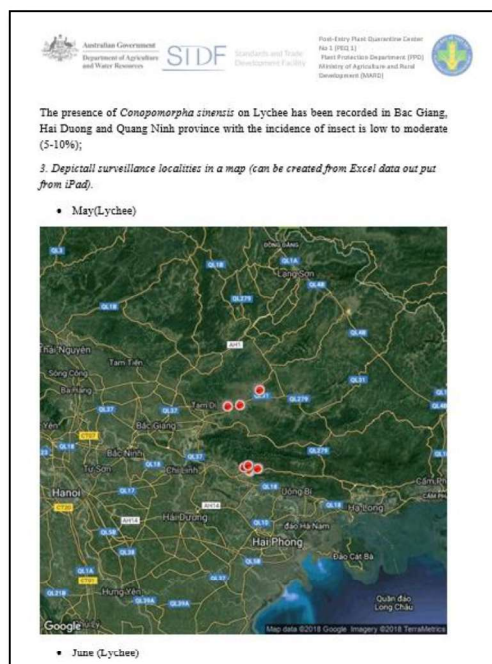
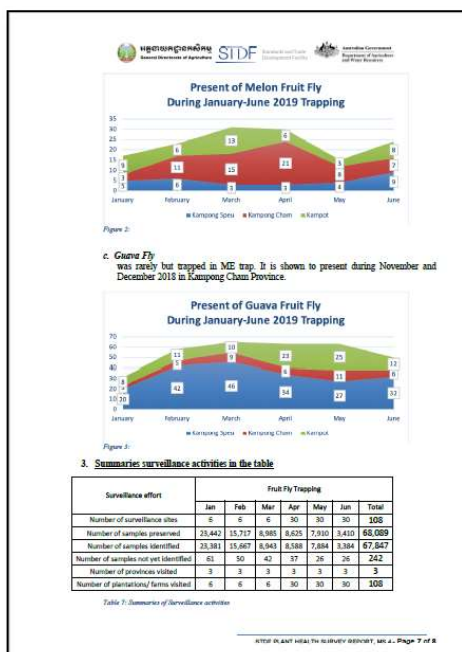
Process - Field Surveillance methodology:

- Surveys shall be conducted in known farms and mango fields within commercial and semi-commercial large mango planting area.
- To assure coverage of the entire region of interest, sampling of fruit fly will be made through placing traps with Methyl eugenol and cue lure pheromone at the identified site.
- Traps were placed under trees at the sites with distribution of 4 traps/ha, or at non-host trees.
- All fruit fly samples shall be collected in the sampling bottle and sent to the Entomology Unit of Plant Biosecurity Division Kuala Lumpur for further identification.

Fig 2: Fruit fly trap

Labeling Insect Samples

Surveillance reporting - Templates



Surveillance Training



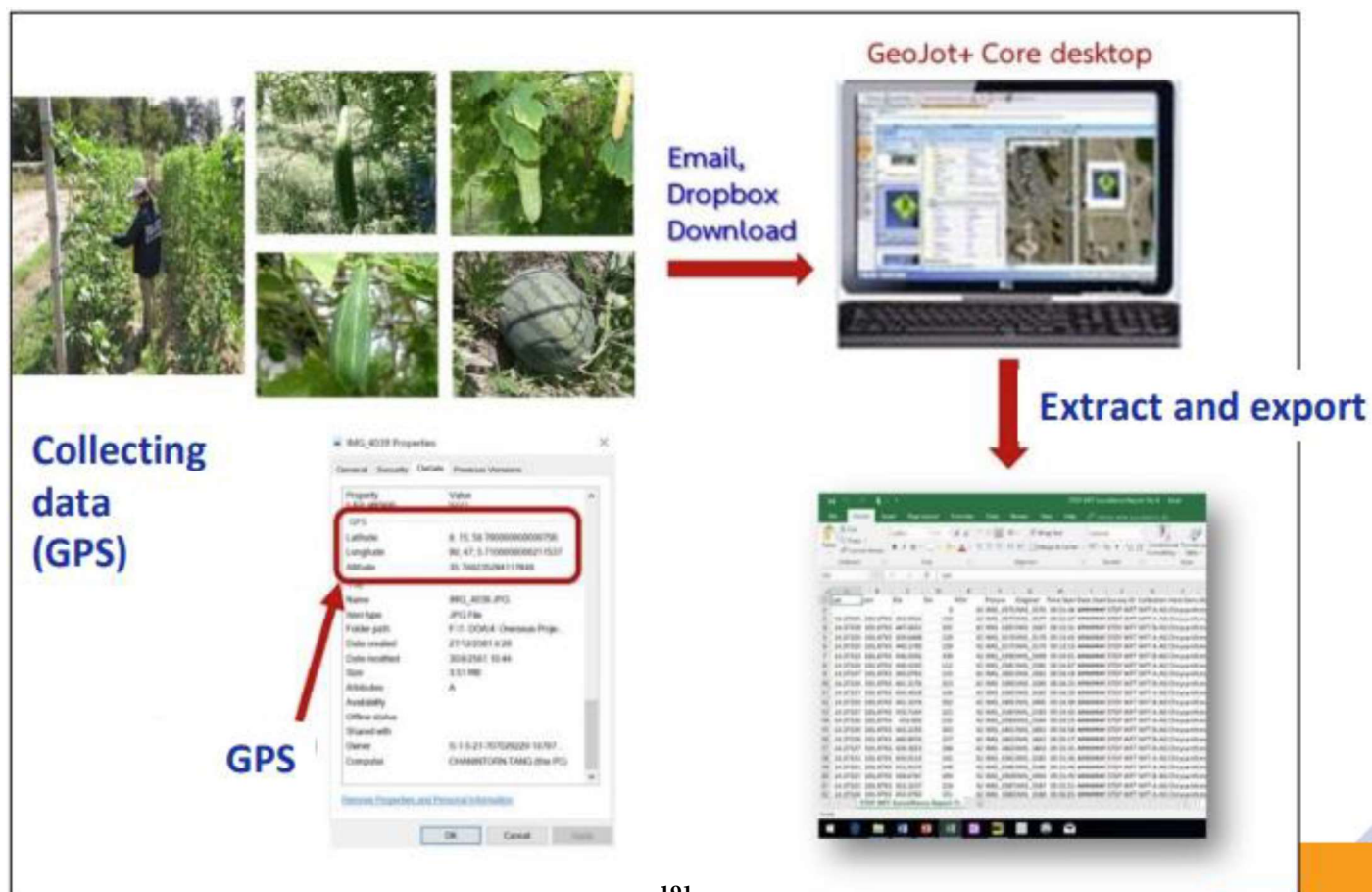
Skills in planning and implementing pest surveillance for trade and biosecurity objectives.

Project Activities



Skills in planning and implementing pest surveillance for trade and biosecurity objectives.

Surveillance Information Management System (SIMS)



COVID Challenges - Pest surveillance and reporting project



February 2020 – 2022: Delays due to Covid travel restrictions

- Reduced surveillance activities
- Local training
- Final reports submission
- Virtual Steering Committee Meeting
- Monitoring and Evaluation - Country



Pest surveillance and reporting project - Steering Committee meeting:



Face to Face Final Steering Committee Bangkok (August 2022).

Benefits of STDF pest surveillance and reporting project

- Use of **standardised templates for planning surveillance activities**
- **29 surveillance protocols** for pests/crops
- **Surveillance activities** performed over **at least two years** in each country
- **Country-specific, surveillance data to support pest management, market access**
- **Proficiency in the use of P-Tracker app, surveillance and Surveillance Information Management System (SIMS)**
but **transitioning to 'next-generation' data collection apps.**



Benefits of STDF pest surveillance and reporting project

- **Increased exports** for surveyed plant products.
- **Reduction in non-compliance** notifications
- Countries have also **identified** their **next surveillance targets or priorities** **pests associated with fresh fruits potentially for exporting.**
- Informal **Asia-Pacific Surveillance network** between project participants.
- Interest in contributing to and benefiting from **Asia-Pacific Surveillance network** initiated by Australia
- Assisted with development of regional, **forest health network** (ACIAR project) and bilateral **surveillance project with Vietnam** (Australia - Vietnam Enhanced Economic Engagement Strategy).



**Plant
Surveillance
Network**
Australasia-Pacific

Main project sustainability issue

1. GeoJot+ surveillance app, **AUD\$500 annual fee**
2. (GeoJot+ **Discontinued** in 2023)



Alternative open-source, data collection apps

- The use of **free open-source mobile data collection platforms** would ease the ongoing monetary costs associated with licence fees.
- Some STDF project countries **developed their own data collection apps** following the concept and features of the STDF surveillance and reporting Project.
- Compatible on **all devices**.
- Training available on **YouTube**.



The Philippines

- Bureau of Plant Industry (BPI) **developed their own digital Android-based ODK mobile app** and surveillance information management system.
- Apps used to conduct **pest and disease surveillance for cassava, corn and rice** (BPI Collect and Pest and Disease Risk Identification and Management (PRIME) Collect, respectively).



BPI Collect



PRIME

BPI Collect App <https://youtu.be/1CamTKFnoK4>
DA-PRIME project <https://youtu.be/PwNTKTnj2ek>

The Philippines

“Proud and Confident Experts in Surveillance”

Surveillance Applications Developed



Monitoring Procedure



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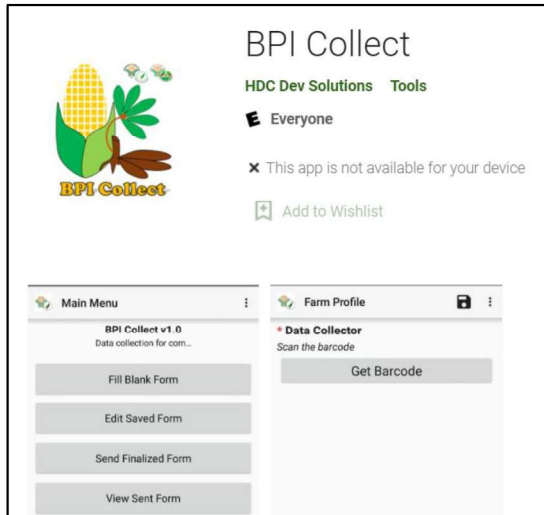
BPI first detected Fall Armyworm in the country through their surveillance app.

*A food-secure and resilient Philippines
with empowered and prosperous farmers and fisherfolk*



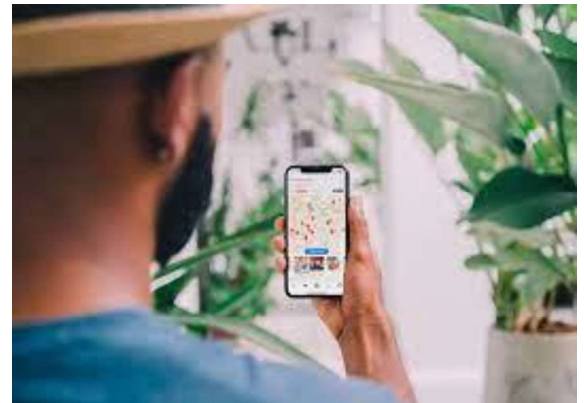
The Philippines

“Proud and Confident Experts in Surveillance”



Thailand

- Most **mobile phones** allow users to automatically geocode photos and display them on basic maps,
 - Thailand has used this option.
- Thailand has used **Google forms** and **MS Excel spreadsheet** as alternatives to P-tracker and GeoJot+ Core



Fruit fly trap collections-old way



Fruit fly trap collections



Kobo-Fly

A field data collection system for fruit fly surveillance

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| Achieving timeliness of surveillance | Solution |
|---|--|
| <p>For crop protection, the value of pest surveillance data depends critically upon its timeliness. The lag between trap servicing and digital capture of the data reduces the value of surveillance data for management if the window of opportunity for undertaking pest control has passed.</p>  | <p>We have developed Kobo-Fly – an app based on ODK platform for the application in the FFIPM project.</p> <p>Kobo-Fly is an attractive, simple-to-use system for collecting data in a robust, timely manner. The system mimics the traditional approach to data collection, enhancing user experience and saving time in manual data digitisation and can be tailored to users' needs.</p> <p>For conventional trap data collection, our developed system uses two linked forms:</p> <ul style="list-style-type: none"> • trap deployment form • regular data entry form linked to deployed trap. |
| <h3 style="background-color: #2c3e50; color: white; padding: 2px 5px;">Paper vs digital approach</h3> <p>Many teams still rely on paper and spreadsheet methods to record information in the field. This poses delays and makes process error prone and often not consistent between enumerators and teams.</p> <p>This time-consuming and labour-intensive process introduces significant time-delays into the system and is error-prone throughout.</p> | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>1 Deploy</p>  </div> <div style="text-align: center;"> <p>2 Collect</p>  </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>3 Cloud databases</p>  </div> <div style="text-align: center;"> <p>4 Manage, analyse and visualise</p>  </div> </div> |
| <p>Data collected in the field using KoboFly is available for web-mapping almost instantly, reducing the amount of time needed to collect, digitise, clean and merge trapping data.</p> | <ul style="list-style-type: none"> • Kobo-fly works in online and offline mode • Compatible with Android and iPhone • Highly customizable • Bar-code reader, pictures facility • Instant reports and maps |







Horizon 2020
European Union Funding
for Research & Innovation

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EpiCollect, a free and easy-to-use mobile data-gathering platform

<https://five.epicollect.net/>.

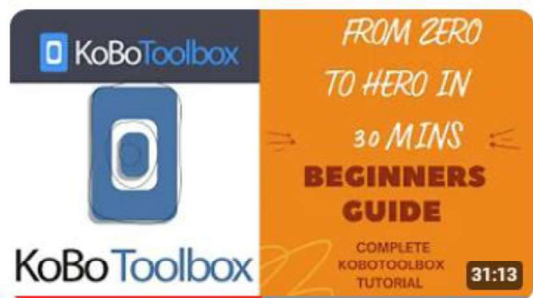
Papua New Guinea (PNG)

- Has used another alternative app, **KOBO Toolbox**, for surveillance data collection.
- PNG was trained in the use of this app by the Pacific Community (SPC) for Coconut Rhinoceros Beetle surveillance.



PNG

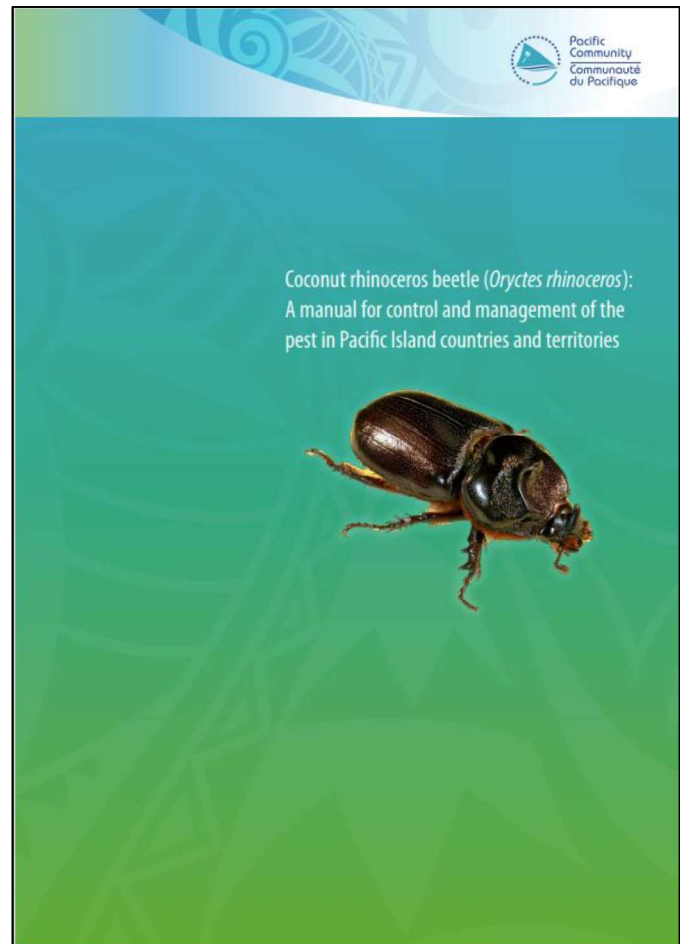
KOBO Toolbox was identified and adopted as part of the **Pacific Awareness and Response to the Coconut Rhinoceros Beetle (PARC)** project.



EDC 07 Learn Kobotoolbox in 30mins - A quick beginner's guide and tutorial on this All in one tool

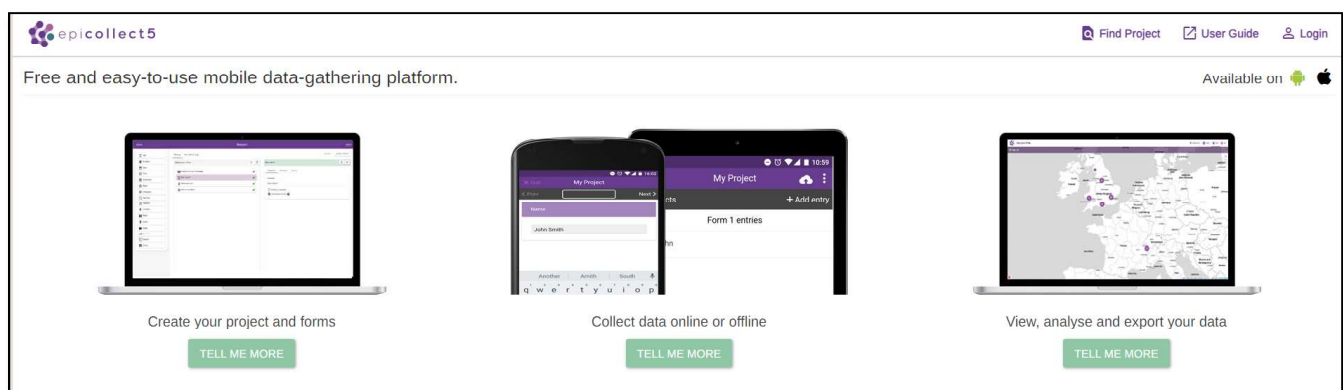
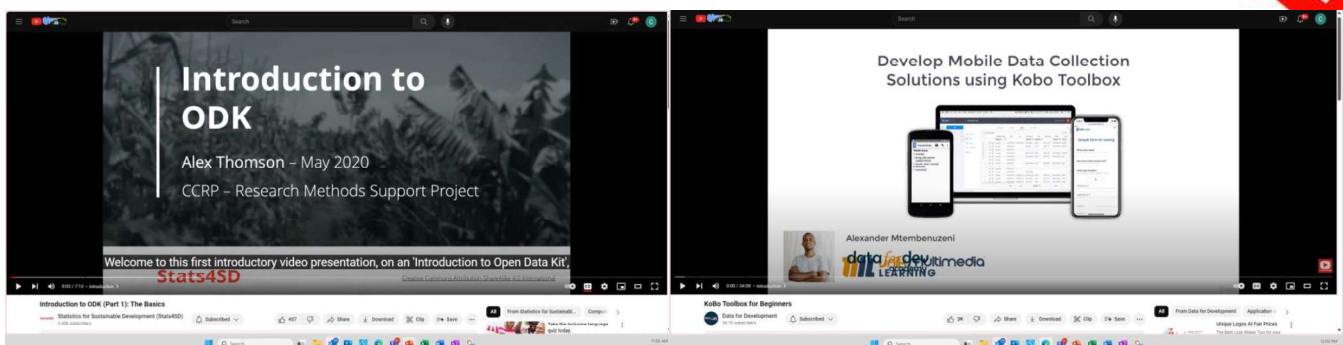
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<https://youtu.be/ZnjHw6SKATg?si=o8J4c1WqdNq7BFod>



Training - open-source, data collection apps

FREE



Thank you for listening

Any Questions?



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