Biosecurity Plan for the Tea Tree Industry

A shared responsibility between government and industry

Version 1.1 October 2019

Plant Health AUSTRALIA

PURE AUSTRALIAN TEA TREE OIL

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The *Biosecurity Plan for the Tea tree Industry* project was coordinated by Plant Health Australia and developed through a partnership approach with government and industry.

The following organisations and agencies were involved in the development and finalisation of the plan:

Endorsement

The *Biosecurity Plan for the Tea tree Industry (Version 1.0)* was formally endorsed by the tea tree industry (through the Australian Tea Tree Industry Association) in April, 2019, and all state and territory governments (through the Plant Health Committee) in September, 2019. The Australian Government endorses the document without prejudice for the purposes of industry's planning needs and meeting the Department's obligations under Clause 13 of the Emergency Plant Pest Response Deed (EPPRD). In providing this endorsement the Department notes page 38 of the Plan which states: "This Document considers all potential pathways by which a pest might enter Australia, including natural and assisted spread (including smuggling). This is a broader view of potential risk than the Biosecurity Import Risk Assessment (BIRA) conducted by the Department of Agriculture which focus only on specific regulated import pathways."

Reporting suspect pests

Any unusual plant pest should be reported immediately to the relevant state/territory agriculture department through the Exotic Plant Pest Hotline (1800 084 881). Early reporting enhances the chance of effective control and eradication.

IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE
1800 084 881

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LIST OF ACRONYMS

ACPPO	Australian Chief Plant Protection Office
APVMA	Australian Pesticides and Veterinary Medicines Authority
AS/NZS	Australian Standard/New Zealand Standard
ATTIA	Australian Tea Tree Industry Association
BICON	Australian Biosecurity Import Conditions Database
BIG	Biosecurity Implementation Group
BIRA	Biosecurity Import Risk Analysis
BISOP	Biosecurity Incident Standard Operating Procedure
BMP	Best Management Practise
BOLT	Biosecurity On-Line Training
BP	Biosecurity Plan
BRP	Biosecurity Reference Panel
CABI	Centre for Agriculture and Bioscience International
CCEPP	Consultative Committee on Emergency Plant Pests
CPHM	State Chief Plant Health Manager
QDAF	Department of Agriculture and Fisheries, Queensland
DA	Department of Agriculture
DJPR	Department of Jobs, Precincts and Regions, Victoria
DPI NSW	Department of Primary Industries, New South Wales
DPIPWE	Department of Primary Industries, Parks, Water and Environment, Tasmania
DPIR NT	Department of Primary Industry and Resources, Northern Territory
DPIRD	Department of Primary Industries and Regional Development, WA
EPP	Emergency Plant Pest
EPPO	European and Mediterranean Plant Protection Organization
EPPRD	Emergency Plant Pest Response Deed
FAO	Food and Agriculture Organization of the United Nations
HACCP	Hazard Analysis Critical Control Point
HPP	High Priority Pest
ICA	Interstate Certification Assurance
IGAB	Intergovernmental Agreement on Biosecurity
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
MICoR	Manual of Importing Country Requirements
NAQS	Northern Australian Quarantine Strategy
NDP	National Diagnostic Protocol
NMG	National Management Group
NPBDN	National Plant Biosecurity Diagnostic Network
NPBRDES IC	National Plant Biosecurity Research, Development and Extension Strategy Implementation Committee

NPBS	National Plant Biosecurity Strategy
NSW	New South Wales
NT	Northern Territory
ORC	Owner Reimbursement Costs
PaDIL	Pest and Disease Image Library
PHA	Plant Health Australia
PHC	Plant Health Committee
PIC	Property Identification Code
PIRSA	Primary Industries and Regions South Australia
QA	Quality Assurance
QLD	Queensland
R&D	Research and Development
RDC	Research and Development Corporation
RD&E	Research, Development and Extension
SA	South Australia
SARDI	South Australian Research and Development Institute
SDQMA	Subcommittee for Domestic Quarantine and Market Access
SNPHS	Subcommittee for Plant Health Surveillance
SPHD	Subcommittee on Plant Health Diagnostics
SPS	Sanitary and Phytosanitary
T2M	Transition to Management
TBA	To be announced
TEG	Technical Expert Group
TST	Threat Summary Table
Vic	Victoria
WA	Western Australia
WTO	World Trade Organization

DEFINITIONS

The definition of a plant pest used in this document includes insects, mites, snails, nematodes or pathogens (diseases) that have the potential to adversely affect food, fibre, ornamental crops, bees and stored products, as well as environmental flora and fauna. Exotic pests are those not currently present in Australia. Endemic pests are those established within Australia.

Emergency Plant Pest (EPP) – for a pest to be classified as an emergency plant pest (EPP), it must either be listed in Schedule 13 of the EPPRD, or be determined by the Categorisation Group or National Management Group (NMG) to be of potential national significance and meet at least one of the criteria below:

- a known exotic pest
- a variant form of an established plant pest
- a previously unknown pest
- a confined or contained pest.

High Priority Pest (HPP) – an exotic plant pest identified as one of the greatest pest threats to one or more plant production industries. A HPP must have a High or Extreme overall rating through the Biosecurity Planning process. For more information on risk ratings please refer to page 37.

EXECUTIVE SUMMARY

To ensure its future viability and sustainability, it is important that the Australian tea tree industry, represented by the Australian Tea Tree Industry Association (ATTIA Ltd) as the peak industry body, minimises the risks posed by exotic pests and responds effectively to plant pest threats. This plan is a framework to coordinate biosecurity activities and investment for Australia's tea tree industry. It provides a mechanism for industry, governments and stakeholders to better prepare for and respond to, incursions of pests that could have significant impacts on the tea tree industry. It identifies and prioritises exotic plant pests (not currently present in Australia) and established pests of biosecurity concern and focus on future biosecurity challenges.

The *Biosecurity Plan for the Tea Tree Industry* was developed in consultation with the Tea Tree Technical Expert Group (TEG) and Tea Tree Biosecurity Implementation Group (BIG), which consisted of plant health and biosecurity experts and industry representatives. These groups were coordinated by Plant Health Australia (PHA) and included representatives from ATTIA Ltd, relevant state and territory agriculture agencies and PHA.

The development of Threat Summary Tables (TST), constituting a list of almost 50 exotic plant pests and the potential biosecurity threat that they represent to the Australian tea tree industry was key to the industry biosecurity planning process. Each pest on the list was given an overall risk rating based on four criteria; entry, establishment, spread potential, and economic impact. In this biosecurity plan, established pests of biosecurity significance for the tea tree industry were also identified (Table 2) as good biosecurity practice is beneficial for the ongoing management and surveillance for these pests.

The Biosecurity Plan for the Tea Tree Industry also details current mitigation and surveillance activities being undertaken and identifies contingency plans, fact sheets and diagnostic protocols that have been developed for pests relevant to the tea tree industry (Table 5). This enables identification of gaps and prioritises specific actions, as listed in the Biosecurity Implementation Table (Table 4). The development of this table will increase the tea tree industry's biosecurity preparedness and response capability by outlining specific areas of action which could be undertaken through a government and industry partnership.

This biosecurity plan is principally designed for decision makers. It provides the Australian tea tree industry and government with a mechanism to identify exotic plant pests as well as to address the strengths and weaknesses of the tea tree industry's current biosecurity position. It is envisaged that annual reviews of *Biosecurity Plan for the Tea Tree Industry* will be undertaken to assess progress against agreed activities, with another formal review conducted in five years.

The biosecurity plan is a document outlining the commitment to the partnership between the tea tree industry and government to improve biosecurity for the tea tree industry.

SIGNIFICANT BIOSECURITY THREATS

Document overview

Biosecurity for the Australian tea tree industry focuses on five key areas outlined below, and identifies the components to be implemented over the life of the biosecurity plan 2019-2023.

High priority exotic pests, established pests and weeds of biosecurity significance

A key outcome of this biosecurity plan is the identification of the exotic High Priority Pests (HPP), and established pests and weeds of biosecurity significance for the Australian tea tree industry (Page 4). This section includes:

- exotic HPPs, are the most significant potential exotic pest threats affecting the tea tree industry, as identified through a prioritisation process
- established pests of biosecurity significance identified in consultation with the Australian tea tree industry
- established weeds of biosecurity significance, as identified by industry and government.

The exotic HPP list, established pests and weeds of biosecurity significance will allow industry and government to better prioritise preparedness activities and will assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers, development of surveillance programs and diagnostic protocols, as well as development of pest-specific mitigation activities.

Implementing biosecurity for the Australian tea tree industry 2019-2023

This section (Page 17) includes the biosecurity implementation plan and a gap analysis of the current level of preparedness for HPPs of the Australian tea tree industry. The Australian tea tree Biosecurity Implementation Group (BIG), comprised of both industry and government representatives, developed the implementation plan that sets out shared biosecurity goals and objectives over the next five years. It is intended that the biosecurity implementation plan is revisited by the Australian tea tree Biosecurity Reference Panel (BRP) regularly over the next five years to maintain its relevance.

Threat identification and pest risk assessments

Guidelines are provided for the identification and ranking of biosecurity threats through a process of qualitative risk assessment. The primary goal is to coordinate identification of exotic pest threats that could impact productivity, or marketability. This plan strengthens risk assessment work already being done both interstate and overseas. All exotic tea tree biosecurity pest threats considered in the biosecurity plan are detailed in TST (Appendix 2: Threat Summary Tables). From the prioritisation process undertaken in the TST, pests with an overall high rating were identified as a HPP (Table 1). Established pests and weeds of biosecurity significance, as determined by the criteria on page 11, are also listed.

Risk mitigation and preparedness

This section provides a summary of activities to mitigate the impact of pest threats on the Australian tea tree industry, along with a set of guidelines for managing risk at all operational levels. Many pre-emptive practices can be adopted by plant industries and government agencies to reduce risks. The major themes

covered include:

- Barrier quarantine
- Surveillance
- Training
- Awareness
- Farm biosecurity
- Reporting of suspect pests

A summary of pest-specific information and preparedness documents, such as fact sheets, contingency plans and diagnostic protocols are also described to outline activities industry has undertaken to prepare for an exotic pest incursion. Information for industry on how to align preparedness activities with R,D&E, such as researching Integrated Pest Management (IPM) strategies, resistance breeding and chemical control is also provided.

Response management

This section provides a summary of the processes in place to respond to emergency plant pest (EPP)[1] incursions that would affect the Australian tea tree industry. Areas covered in this section include the Emergency Plant Pest Response Deed (EPPRD), PLANTPLAN (outlines the generic approach to response management under the EPPRD), categorisation of pests under the EPPRD and industry specific response procedures and industry communication.

PESTS AND WEEDS OF BIOSECURITY SIGNIFICANCE OVERVIEW

One of the primary goals of this document is to coordinate the identification of the key exotic pests and established pests and weeds of biosecurity significance to the Australian tea tree industry. This section provides information on the High Priority Pest list, the established pests of biosecurity significance and the established weeds of biosecurity significance for the tea tree industry. These pest lists were developed in consultation with industry and governments stakeholders and provide the information to aid prioritisation of resources for biosecurity risk management.

[1] Refer to the PHA website for details planthealthaustralia.com.au/biosecurity/emergency-plant-pests/

Tea tree industry exotic High Priority Pests

Table 1 provides an overview of the top ranked exotic pest threats to the Australian tea tree industry. Further details on each pest along with the basis for the likelihood ratings are provided in the TST (Appendix 2: threat summary tables). Assessments may change due to increased understanding of pest biology, changes to fresh ginger import arrangements, or production methods. The HPP list will be formally reviewed on an annual basis through the Biosecurity Reference Panel.. An explanation of the method used for calculating the overall risk can be found on the PHA website[2].

Table 1. Tea tree industry High Priority Pest list.

COMMON NAME (SCIENTIFIC NAME)	HOST(S)	AFFECTED PLANT PART	DISPERSAL	ENTRY POTENTIAL	EST.[3] POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Invertebrates								
Coleoptera (beetles and weevils)								
Black twig borer, shot hole borer (*Xylosandrus compactus*) (with wood rotting fungi including *Fusarium solani*)[4]	Very broad host range (200 species from 60 different families) including soursop, tea, coffee, *Acacia* spp., cinnamon, mango, macadamia, avocado, pine, olive, mahogany, *Meleleuca* spp.[5]	Stems	Infested plant material. Adults are capable of flight	HIGH	MEDIUM	HIGH	HIGH	**HIGH**

[2] Available from planthealthaustralia.com.au/biosecurity/risk-mitigation
[3] Establishment potential
[4] Vector of various wood rotting fungi (including *Fusarium solani*) which females cultivate to raise young.
[5] *Melaleuca leucadendron* is susceptible to black twig borer (Nelson and Davis).

COMMON NAME (SCIENTIFIC NAME)	HOST(S)	AFFECTED PLANT PART	DISPERSAL	ENTRY POTENTIAL	EST.[3] POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Pathogens								
Fungi								
Myrtle rust (*Austropuccinia psidii*) (exotic strains) [6]	Myrtaceae	Leaves, shoots	Infected plant material. Dispersed by airborne spores, infected tools and machinery	HIGH	HIGH	HIGH	HIGH	**HIGH**
(*Calonectria brassicae* syn. *C. gracile*)	Broad host range including carrot, coconut, pines, potato, soybean, peanut, peas, beans, macadamia, lucerne, *Pinus* spp., capsicum, *Melaleuca* spp., callistemon, rice	Roots	Infected plant material. Dispersed by soilborne spores and infected tools and machinery[7]	HIGH	HIGH	HIGH	UNKNOWN	**UNKNOWN**
Leaf spot, stalk rot, root rot (*Calonectria pteridis*)	Peanut, *Melaleuca* spp., *Calistemon* spp., coconut, *Eucalyptus* spp., *Pinus* spp., *Rhododendron* spp.	Leaves, stems	Infected plant material. Dispersed by airborne spores and infected tools and machinery[8]	HIGH	HIGH	HIGH	UNKNOWN	**UNKNOWN**
Oomycetes								
Sudden oak death (*Phytophthora ramorum*)	Broad host range including oak trees, *Arbutus* spp., *Lithocarpus* spp., fir, maple, Ericaceae family (including blueberry), *Eucalyptus gunnii*, beech, bay laurel, magnolia, yew, *Melaleuca* spp. [9]	Stems, branches and leaves	Infected plant material. Dispersed by airborne and soilborne spores and infected tools and machinery.	HIGH	HIGH	HIGH	HIGH	**HIGH**

[6] The taxonomy of this species is poorly understood as is the pathogenicity of different strains.
[7] *Calonectria* spp. are known to be seedborne. More likely to be an issue in tea tree nurseries and new plantations than established plantations.
[8] *Calonectria* spp. are known to be seedborne. More likely to be an issue in tea tree nurseries and new plantations than established plantations.
[9] The known host range continues to expand with more research. *Melaleuca squamea* has been identified as a potentially highly susceptible host (Ireland et al., 2012).

Established pests of biosecurity significance

Introduction

This section identifies established pests of biosecurity significance for the Australian tea tree industry. By identifying pests which tea tree producers already have to manage, mechanisms can be put in place to better align industry and government resources and provide a stronger base for biosecurity risk management for the tea tree industry.

Identification of established pests of biosecurity significance will also assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers, surveillance coordinators, diagnosticians and development of pest-specific mitigation activities.

Threat identification

Information on the pests described in this section came from a combination of:

- past records
- existing industry protection plans
- industry practice and experience
- relevant published literature
- local industry and overseas research
- specialist and expert judgment.

In order to be considered as an established pest of biosecurity significance, the pests included in Table 2 should be economically important to the tea tree industry and at least one of the following:

- restricted to regions within Australia
- notifiable by law
- have market access implications
- able to be prevented from entering a farm through good biosecurity practices.

These pests were considered in an effort to prioritise investment, but did not undergo a formal pest risk assessment.

Table 2. Established pests of biosecurity significance

COMMON NAME (SCIENTIFIC NAME)	**HOSTS**	**AFFECTED PLANT PART**	**DISTRIBUTION IN AUSTRALIA**	**STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS**	**FACTSHEETS**	**COMMENTS**
Invertebrates						
Coleoptera (beetles and weevils)						
Bark eating weevil, white headed weevil (*Aades griseatus*)	*Melaleuca* spp. (including *M. alternifolia*)	Stems	NSW, QLD	None	Not developed	
Christmas beetle (*Anoplognathus porosus*)	*Eucalyptus*, *Melaleuca*	Leaves	NSW, QLD, VIC	None	Yes- QDAF[10]	Adult beetles feed in swarms and can cause damage to young tea tree plantations, especially where plantations are close to pastures and grasslands.
Pitted apple beetle (*Geloptera porosa*)	*Melaleuca* spp (including *M. alternifolia*), apple	Roots and stems	NSW, [11] QLD[12]	WA	Not developed	Little is known about the lifecycle of this pest.[13]

[10] business.qld.gov.au/industries/farms-fishing-forestry/forests-wood/trees-timber/christmas-beetle
[11] There is one record of pitted apple beetle being in Victoria and it is not know how widely distributed this pest is.
[12] It is unclear if the pitted apple beetle found in Queensland is this species or a different species.
[13] Entwistle, P (2013) Improving the Sustainability of Plant Protection in Tea Tree Oil Production Systems, 12/086, Project No. PRJ-005771, Rural Industries Research and Development Corporation, Canberra.

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
African black beetle (*Heteronychus arator*)	Broad host range including Eucalyptus, *Melaleuca* (including *M. alternifolia*), pineapple, potato, grapevine, grasses (including *Bromus catharticus* (prairiegrass), *Lolium perenne* (perennial ryegrass), *Pennisetum clandestinum* (Kikuyu), *Saccharum officinarum* (sugarcane), *Zea mays* (maize))[14]	Stems	NSW, QLD, SA, VIC, WA [15]	TAS	Not developed	More information about African black beetle can be found at: agric.wa.gov.au/olives/african-black-beetle-horticulture
Red shouldered leaf beetle (*Monolepta australis*)	Avocado, beans, citrus, cotton, macadamias, Eucalypts, Melaleuca, corn, sugarcane	Above ground plant parts	QLD, NSW, NT, WA	None	Yes- QDAF[16]	More information at arboristnetwork.com.au/Fact Sheets/Monolepta%20australis.pdf

[14] Campbell AJ, Maddox CDA. Insect Pests of Tea Tree: Can Plantation Pests be Managed?. In: Southwell I, Lowe R, eds. *Tea Tree: the Genus* Melaleuca. Amsterdam: Hardwood Academic Press.

[15] Karpyn Esqueda, M, Yen, AL, Rochfort, S, Guthridge, KM, Powell, KS, Edwards, J and Spangenberg, GC, 2017. A review of perennial ryegrass endophytes and their potential use in the management of African black beetle in perennial grazing systems in Australia. Frontiers in Plant Science, 8, p. 3.

[16] business.qld.gov.au/industries/farms-fishing-forestry/agriculture/crop-growing/pests-field-crops/leaf-beetles

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
Elephant weevil (*Orthorhinus cylindrirostris*)	Blueberry, citrus, grapevine, *Eucalyptus*, *Melaleuca*	Above ground plant parts	NSW, QLD, SA, TAS, VIC, WA	None	Not developed	Elephant weevils are native to Australia and feed on many native tree species and some fruit tree species. More information can be found at dpi.nsw.gov.au/agriculture/horticulture/berries/growing-guides/berry-plant-protection-guide
Pyrgo beetle (*Paropsisterna tigrina*)	*Melaleuca* spp. (including *M. quinquenervia, M. alternifolia* and *M. linariifolia* species complex)[17][18]	Leaves	NSW, QLD	None	Not developed	Pyrgo beetle can result in yield losses as high as 80 per cent if not managed.[19]
Faex beetle (*Paropsides calliope*)	*Melaleuca* spp. (including *M. alternifolia*)	Leaves	NSW, VIC, TAS	None	Not developed	

[17] Rayamajhi MB, Purcell MF, Van TK, Center TD, Pratt PD, and Buckingham GR, (2002). Australian Paperbark Tree Melaleuca In Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, 413 p.
[18] May have been observed on *Callistemon*.
[19] Entwistle, P (2013) Improving the Sustainability of Plant Protection in Tea Tree Oil Production Systems, 12/086, Project No. PRJ-005771, Rural Industries Research and Development Corporation, Canberra.

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
Hemiptera (stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)						
Common spittlebug (*Philagra parva)*	Casuarina, Grevillea, Melaleuca, wattles	Above ground plant parts	NSW, QLD, VIC	None	Not developed	
Tea tree psyllid (*Trioza sp.*)[20]	Tea tree	Leaves	NSW, QLD	None	Not developed	

[20] This species looks very similar to the tomato potato psyllid (*Bactericera cockerelli*).

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
Hymenoptera (ants and wasps)						
Yellow crazy ant (*Anoplolepis gracilipes*)	-	-	NSW[21], NT, QLD	QLD, NSW	Yes- QDAF[22], NSW[23]	Yellow crazy ants are established and regularly detected in some suburbs of Brisbane and Cairns and the Hervey Bay and Townsville regions of QLD, in the Darwin and Arnhem Land regions of NT and on Christmas Island. They are under active management in the NT and QLD and have been eradicated from NSW and are under eradication in the Lismore region. After harvest and distillation spent tea tree biomass is sold as mulch. Invasive ant species could impact on the trade of tea tree mulch. Another species of invasive ant (red imported fire ant (*S. invicta*)) is currently under eradication in south east Queensland. There are three red imported fire ant biosecurity zones with movement restrictions on mulch[24].

[21] Yellow crazy ant is currently under eradication in the Lismore region of NSW
[22] daf.qld.gov.au/__data/assets/pdf_file/0011/76637/ipa-yellow-crazy-ants-PA28.pdf
business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/health-pests-weeds-diseases/pests/invasive-animals/restricted/yellow-crazy-ant
[23] dpi.nsw.gov.au/biosecurity/insect-pests/yellow-crazy-ant
[24] daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/ants/fire-ants

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
Gall wasp (*Dasineura sp.*)	Tea tree (*M. alternifolia*)	Flowers	NSW	None	Not developed	There is little information on gall wasp species affecting *Melaleuca alternifolia*, however, there is information on a *Dasineura* species on *Leptospermum laevigatum* available at: rbg.vic.gov.au/documents/Muelleria_30-1_5_Veenstra.pdf
Melaleuca saw fly, paperbark saw fly (*Lophyrotoma zonalis*)	*Melaleuca* spp. (including *M. alternifolia*)	Leaves	NSW, NT, QLD, VIC	None	Not developed	
Pathogens and nematodes						
Fungi						
Myrtle rust (*Austropuccinia psidii* (established strains))[25]	Myrtaceae[26]	Leaves, shoots	NSW, NT, QLD, TAS, VIC	SA, WA	Yes- ATTIA, NSW DPI, Tas DPIPWE, QDAF[27]	
Elsinoë scab (*Elsinoë eelemani*)	Tea tree (*M. alternifolia*)	Leaves, stems	NSW	VIC	Yes- ATTIA	*E. eelemani* is a newly described species and it is not known how widely distributed it is. There are records of other *Elsinoë* spp. in other states in Australia.

[25] The taxonomy of this species is poorly understood as is the pathogenicity of different strains.

[26] Zauza EAV, Alfenas AC, Old K, Couto MMF, Graça RN and Maffia LA, (2010) Myrtaceae species resistance to rust caused by *Puccinia psidii*. Australasian Plant Pathology, 39, 406–411

[27] teatree.org.au/myrtle_rust.php; dpi.nsw.gov.au/biosecurity/plant/insect-pests-and-plant-diseases/myrtle-rust; dpipwe.tas.gov.au/Documents/myrtle.pdf; business.qld.gov.au/industries/farms-fishing-forestry/agriculture/crop-growing/priority-pest-disease/myrtle-rust

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
Dieback (*Neofusicoccum* spp., *Dactylonectria* sp., *Calonectria* spp.)[28]	Broad host range including Melaleuca and other woody tree species	Stems, leaves	NSW, QLD	WA[29]	Not developed	*Neofusicoccum* affects tea tree branches, causing a dieback, typically from the top of the branch to the base. It does not affect the root system. It is best managed by pruning out affected parts of the plant. *Dactylonectria* spp. (including *D. alcacerensus* and *D. pauciseptata* and *Calonectria* sp. (including *Calonectria seminaria*) have been isolated from diseased *Melaleuca* but they have not been confirmed to cause disease through Koch's postulates.

[28] *Dactylonectria alcacerensis* has been isolated from *Melaleuca alternifolia* showing symptoms of stump dieback. Pathogenicity testing has not been completed, however, the symptoms appear to be similar to those caused by *Calonectria*.
[29] *Neofusicoccum arbuti* is a declared pest in WA. It is not known if this species affects *Melaleuca alternifolia*.

COMMON NAME (SCIENTIFIC NAME)	HOSTS	AFFECTED PLANT PART	DISTRIBUTION IN AUSTRALIA	STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY PESTS	FACTSHEETS	COMMENTS
Charcoal rot (*Macrophomina phaseolina*)	Broad host range including Melaleuca, Eucalyptus, grains, okra, palms, onion, kiwifruit, garlic, jackfruit, ginger, jute, Malabar spinach, brassicas, silk cotton tree, flax, sugarbeet, hemp, pawpaw, guar, Solanaceous crops, mulberry, safflower, cedar, celosia, rice, chicory, olive, citrus, coriander, cotton, saffron, cucurbits, turmeric, carrot, jimsonweed, medic, mango, cumin, cassava, strawberry, fringed hibiscus, balsam, jasmine, sweetpotato, maize, daffodil, grapevine, Guayule, sugarcane stonefruit,, pelargoniums, vanilla	Roots	NSW, QLD, SA, VIC, TAS, WA	None	Not developed	There are fact sheets available for charcoal rot for annual crops but not for tea tree.

Established weeds of biosecurity significance

Introduction

This section identifies established weeds of biosecurity significance for the tea tree industry. By identifying and prioritising weeds which tea tree producers already have to manage, or may have to deal with in the future, mechanisms can be put in place to better align industry and government resources and provide a strong base for biosecurity risk management for the tea tree industry.

Although weeds were not formally included in the EPPRD at the time that this biosecurity plan was released, exotic weeds may be responded to in a similar way to exotic plant pests in the future. Therefore, it is critical that the tea tree industry start reviewing the threat of weeds to their production system.

Identification of weeds of significance will also assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers and botanists, and development of specific incursion response plans if an incursion of the weed occurs, or if the weed spreads further in production regions of Australia.

Threat identification

Information on the weeds described in this section came from a combination of:

- past records
- existing industry protection plans
- industry practice and experience
- relevant published literature
- local industry and overseas research
- specialist and expert judgment.

Prioritising weed threats

In order to be considered as an established pest of biosecurity significance, the pests included in Table 3 should be economically important to the tea tree industry and at least one of the following:

- restricted to regions within Australia
- notifiable by law
- have market access implications
- able to be prevented from entering a farm through good biosecurity practices.

These weeds were considered in an effort to prioritise investment, but did not undergo a formal risk assessment.

Table 3. Established weeds of biosecurity significance

COMMON NAME (SCIENTIFIC NAME)	**DISTRIBUTION IN AUSTRALIA**	**STATE MOVEMENT CONTROLS OR MARKETS IMPACT BY WEED**	**FACTSHEETS**	**ADDITIONAL COMMENTS**
Ragweed (*Ambrosia artemisiifolia*)	NSW, QLD, VIC	NT, SA, WA	Yes- NSW, QLD[30]	There are herbicide resistant strains of ragweed in tea tree growing regions. Biocontrols are available but ragweed is still an issue in many areas.
Cobbler's peg (*Bidens pilosa*)	NSW, NT, QLD, SA, VIC, WA	None	Yes- QLD[31]	There are herbicide resistant strains of cobbler's peg in tea tree growing regions
Colombian waxweed (*Cuphea carthagenensis)*	NSW, QLD	None	None	
Bellvine (*Ipomea plebia*)	NSW, NT, QLD, WA	None		More information at keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ipomoea_plebeia.htm
Torpedo grass (*Panicum repens*)	NSW, QLD	None	None	
Setaria (*Setaria* spp.)	NSW, NT, QLD, SA, TAS, VIC, WA	None	NSW[32]	There are haloxyfop resistant strains of *Setaria* in tea tree growing regions. Different species of *Setaria* spp. have different ranges within Australia. More information at ausgrass2.myspecies.info/content/setaria-0

[30] business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/health-pests-weeds-diseases/weeds-diseases/invasive-plants/restricted/annual-ragweed;, weeds.dpi.nsw.gov.au/Weeds/Details/8

[31] keyserver.lucidcentral.org/weeds/data/media/Html/bidens_pilosa.htm

[32] *Setaria palmiflora* weeds.dpi.nsw.gov.au/Weeds/PalmGrass

Implementing biosecurity for the Australian tea tree industry 2019-2023

Following the prioritisation and gap analysis through the Australian Tea Tree Biosecurity Implementation Group (BIG) biosecurity planning process, both industry and government have developed an implementation plan that sets out shared biosecurity goals and objectives. This section contains a Biosecurity Implementation Table, which was developed to act as a guide for biosecurity activities for the Australian tea tree industry, governments and other stakeholders for 2019-2023. It is intended that the plan is monitored and reviewed annually by the Australian tea tree Biosecurity Reference Panel.

Biosecurity Implementation Table

The Biosecurity Implementation Table aims to build upon the themes outlined in the Intergovernmental Agreement on Biosecurity (IGAB)[33] and the National Plant Biosecurity Strategy (NPBS)[34] by providing a clear line of sight between the development of the *Biosecurity Plan for the Tea Tree Industry* and broader plant health policy and legislation.

This table aims to provide the focus and strategic direction for plant biosecurity activities relating to the tea tree industry over the life of this Biosecurity Plan 2019-2023. The table provides specific recommendations on potential biosecurity activities identified by both industry and government to improve biosecurity preparedness for pest threats.

This table has been developed in recognition that biosecurity is a shared responsibility between the Australian tea tree industry and governments. For this reason, the Biosecurity Implementation Table has been produced to help coordinate actions and resources in the biosecurity system, with the intention of creating an effective and productive biosecurity partnership. Activities may require additional funding to be sourced prior to commencement. Implementing the specific actions listed in the Biosecurity Implementation Table, it will not only strengthen the Australian tea tree biosecurity system, but also the broader plant biosecurity system. Future versions of this table will contain information on the progress made by all participants on the actions included in the Biosecurity Implementation Table (Table 4).

[33] For more information visit agriculture.gov.au/animal-plant-health/pihc/intergovernmental-agreement-on-biosecurity
[34] For more information visit planthealthaustralia.com.au/national-programs/national-plant-biosecurity-strategy/

Table 4. The Biosecurity Implementation Table for the Australian Tea Tree Industry (2019-2023).

Strategy: Capacity and Capability

Aligns with Strategy 4 of NPBS, Schedule 6 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Establish a biosecurity reference panel to help coordinate industry's future biosecurity activities, develop key biosecurity messages/materials and to review the implementation plan annually.	PHA (ATTIA, State Governments)	2019 and then annually	Underway
B. Ensure that biosecurity priorities requiring funding, action or notification are tabled with the relevant funding body or committee: • BRP to identify potential concept proposals to submit to AgriFutures Australia • BRP to identify potential cross sectoral priorities to submit to Plant Biosecurity Research Initiative (PBRI) • PHA to establish mechanisms to notify SNPHS and SPHD of biosecurity priorities	BRP	Annually at biosecurity reference panel (BRP) meeting	
C. Build support and grow membership of the ATTIA Ltd as the Peak industry body for tea tree, as they lead the industry on biosecurity issues, through industry forums and communication networks.	ATTIA	Annually	In progress, ATTIA liaises with growers regularly particularly at general meetings and field days.
D. ATTIA Ltd, as the peak industry body for the tea tree industry, to join PHA to enable industry and government to work together on biosecurity issues.	ATTIA, PHA	Complete	ATTIA joined PHA as a member and became signatory to the EPPRD in 2018

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
E. Industry board members and industry liaison officers/coordinators to undertake relevant deed training provided by PHA • ATTIA staff, board and relevant agricultural consultants to complete the PHA Foundation Course • NMG representatives to complete the National EPP Response Management course • ATTIA Board ask PHA for EPPRD training if there are any changes in Board members • ATTIA staff and relevant agricultural consultants to complete Pest Reporting and Responses: A grower's guide to biosecurity	ATTIA and PHA	2019 and where there are any staffing changes at ATTIA	
F. Establish a network of biosecurity champions within the industry to foster good biosecurity practices	ATTIA, PHA	Ongoing (Assess progress annually)	
G. Seek opportunities to collaborate with more mature industries that have existing biosecurity facilities/programs in place e.g. Forestry Surveillance program	ATTIA	Ongoing	

Strategy: Plant Biosecurity Education and Awareness

Aligns with Strategy 7 of NPBS, Schedule 6 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Promote, disseminate and demonstrate biosecurity to industry through industry forums, newsletters, roadshows, field days, networks and/or workshops (hardcopy and online): • On-farm Biosecurity Planning • Reporting anything unusual • Best biosecurity practice such as hygiene principles	ATTIA, PHA	Ongoing	PHA developed three factsheets which are on the ATTIA website and being distributed by the ATTIA CEO
B. Biosecurity presentations/workshops/tradeshows at industry/AGM events	ATTIA, PHA	17 October 2019 for the ATTIA Field Day	
C. Develop awareness materials (e.g. on-farm biosecurity planner, fact sheets (practice or pest specific), pest guides, shed poster etc), case studies and scenarios to encourage industry engagement on biosecurity issues • Update the Myrtle Rust Biosecurity Guidelines for growers in the Australian Tea Tree Industry to include other pests (exotic and established). • Include QDAF awareness material about exotic ant incursions and biosecurity zones on ATTIA website.	ATTIA, PHA (NSW DPI, AgriFutures)	TBA	As a part of the biosecurity plan three factsheets will be developed
D. Develop a shed poster on exotic and established pests to be on the lookout for to encourage monitoring and reporting if found.	ATTIA, PHA	TBA	
E. Raise awareness of the on-farm biosecurity website: farmbiosecurity.com.au	ATTIA, PHA	TBA	There is information on the ATTIA website and the ATTIA CEO has been raising awareness amongst growers
F. Raise industry-wide awareness of the EPPRD. • Raise awareness of owner reimbursement cost (ORC) frameworks once they have been developed	ATTIA, PHA	Ongoing	ATTIA focuses on communication about the EPPRD with new growers

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
G. A targeted approach to raising awareness of biosecurity is required to ensure risks are mitigated throughout the supply chain (growers, contractors, agronomists, processors etc.). • Raise awareness of biosecurity risks associated with seed/seedlings, an open domestic industry that shares equipment, planting materials, contractors and the distribution of waste post-processing • Raise awareness of movement restrictions on tea tree mulch out of yellow crazy ant control zones[35] and red imported fire ant biosecurity zones[36]	ATTIA, PHA	TBA	The ATTIA Code of Practice includes information about vehicle washdown.
H. Raise understanding of risk pathways (i.e. areas of vulnerability for the industry e.g. seed/seedlings, an open domestic industry that shares equipment, planting materials, contractors and the distribution of waste post-processing)	ATTIA, PHA	TBA	
I. Review and develop detailed fact sheets on the following pests and publish them on the ATTIA website: **Pathogens** Myrtle rust (*Austropuccinia psidii*) *Calonectria brassicae* Leaf spot, stalk rot and root rot (*Calonectria pteridis*)	ATTIA, PHA	TBA	PHA developed three factsheets on biosecurity sudden oak death, black twig borer and fire ants
J. Identify industry biosecurity training and extension needs, recommend priorities.	Biosecurity reference panel, PHA	Annually	

[35] daf.qld.gov.au/__data/assets/pdf_file/0011/76637/ipa-yellow-crazy-ants-PA28.pdf
dpi.nsw.gov.au/biosecurity/insect-pests/yellow-crazy-ant
[36] daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/ants/fire-ants

Strategy: Preparedness and Response

Aligns with Strategy 3 of NPBS, Schedule 7 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Develop an industry specific business continuity plan for: • *Calonectria* species (*C. brassicae*, *C. pteridis*)	ATTIA, AgriFutures Australia, PHA	TBA	A project looking into the causal species of stump dieback has begun.
B. Develop/update a cross sectoral business continuity plan for: • Black twig borer (*Xylosandrus compactus*) • Sudden oak death (*Phytophthora ramorum*)	ATTIA, other relevant Industries, AgriFutures Australia, Commonwealth, PHA	TBA	
C. Promote clean planting material. E.g. work with nursery industry to ensure clean seedling material and link with BioSecure HACCP	ATTIA, State Government, Commonwealth, PHA	Ongoing	ATTIA currently undergoing review of QA systems. Current best practice includes sourcing planting material from reputable sources and sourcing seed from two dedicated orchards.
D. Engage with cross sectoral initiatives to improve preparedness for and response to sudden oak death and black twig borer.	Relevant industries, RDC, State Government, Commonwealth, PHA	TBA	
E. Develop an industry member database to facilitate critical information in the event of an emergency response (to be held confidentially by PHA)	ATTIA, PHA	TBA	ATTIA holds a member database that covers the majority of growers.
F. Develop and update an industry specific Biosecurity Incident Standard Operating Procedures (BISOP) (designed to guide industries in an incursion)	ATTIA, PHA	TBA	
G. Consider categorisation of these High Priority Pests in the Emergency Plant Pest Response Deed • Black twig borer (*Xylosandrus compactus*) • Leaf spot, stalk rot and root rot (*Calonectria brassicae*) • *Calonectria pteridis*	ATTIA, State Governments, Commonwealth, PHA	TBA	
H. Develop an owner reimbursement cost framework	ATTIA, PHA	TBA	

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
I. Investigate funding mechanisms to deal with future emergency plant pest response situations	ATTIA, PHA	Ongoing	The tea tree industry has an EPPR levy set at zero and a R&D levy through AgriFutures Australia.
J. Undertake to sign the EPPRD and investigate the option to establish a PHA and EPPR levy set at zero	Industry, Commonwealth, PHA	Completed	ATTIA became signatories to the EPPRD in 2018 with an EPPR levy set at zero. A decision was made not to establish a PHA levy.

Strategy: Surveillance

Aligns with Strategy 2 of NPBS, Schedule 4 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Raising industry awareness of HPPs, exotic and established pests to ensure better monitoring across the industry and an understanding of the importance of monitoring records regardless of whether a pest is found or not.	ATTIA	Ongoing	ATTIA CEO is doing industry awareness during extension activities with growers. A Need for better connection with government agencies.
B. Establish linkages with the International Plant Sentinel Network to remain informed about plant pests affecting tea tree overseas.	ATTIA	2018-2023	
C. Establish linkages with the National Forest Biosecurity Coordinator and Northern Australia Surveillance Manager to remain informed about surveillance activities underway in other industries.	ATTIA	2018-2023	

Strategy: Diagnostics

Aligns with Strategy 5 of NPBS, Schedule 4 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Identify diagnostic needs for HPPs. • BRP to identify and prioritise actions for diagnostics for the tea tree industry's HPPs	BRP (PHA)	2019	
B. Identify mechanisms to fund diagnostic priorities: • Develop National Diagnostic Protocols for HPPs (as prioritised) o Black twig borer (*Xylosandrus compactus*) o *Calonectria* spp. (including *C. brassicae* and *C. pteridis*)	BRP (AgriFutures Australia, State Government, Commonwealth, PHA, SPHD)	Annually at BRP meeting	A project is with PBRI for consideration on the diagnostic capacity for the NPPPs

Strategy: Established Pests and Weeds

Aligns with Strategy 6 of NPBS, Schedule 5 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Raise industry awareness of pests and weeds of biosecurity significance, and demonstrate how best biosecurity practice has direct relevance to day to day operations for pests already within Australia as well as exotic pests • established myrtle rust strains • tea tree psyllid • red imported fire ant • yellow crazy ant • Elsinoë scab • charcoal rot • bark eating weevil • pitted apple beetle • African black beetle • red shouldered leaf beetle • elephant weevil • Pyrgo beetle • Faex beetle • common spittlebug • gall wasp • Melaleuca saw fly • web moth	ATTIA	2020	ATTIA doing this as part of extension activities
B. Include weeds and established pests of significance in the tea tree biosecurity manual and other biosecurity awareness material. • Include information about *Colonectria* and allied fungi in Myrtle Rust Biosecurity Guidelines and ATTIA website	ATTIA (PHA)	2018-2022	UNE undertaking a scoping study (12 months) on weeds and their problems in the tea tree industry to get built into a biosecurity manual once we have one.

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
C. Opportunity to develop cross sectoral research program to manage pests and weeds in tea tree more generally. • Opportunities to work with forestry, annual field crop industries, lemon myrtle, jojoba and the nursery industry on pests including *Macrophomina*, *Elisnoë*, nursery pathogens and weevils, and weeds.	ATTIA (AgriFutures Australia)	TBA	
D. To investigate the development of permits with the APVMA for established pests of the Australian tea tree industry. If required identify trial work needed to obtain a permit.	ATTIA, AgriFutures Australia, AVPMA	TBA	

Strategy: Biosecurity Research, Development and Extension (RD&E)

Aligns with Strategy 8 of NPBS, Schedule 8 of IGAB

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. To be most effective, development of biosecurity R&D priorities that are listed and agreed to in this table should have a mechanism to feed into the AgriFutures Australia investment planning process, allowing prioritisation within the overall R&D portfolio.	ATTIA, AgriFutures Australia	Annually	
B. Prioritise biosecurity RD&E annually to feed into AgriFutures Australia plant biosecurity RD&E implementation priorities • Consider a project to test the susceptibility of tea tree (*Melaleuca alternifolia*) to *Calonectria brassicae*, *Calonectria ovata*, *Calonectria pteridis, Xylella fastidiosa*, *Xylosandrus compactus* and *Phytophthora ramorum*	ATTIA, AgriFutures Australia	Annually	
C. Consider collaborative opportunities to maximise R&D investment in biosecurity	ATTIA, AgriFutures Australia, NPBRDES IC, PBRI	Ongoing	A project for a diagnostic protocol for exotic myrtle rust strains and their potential pathways into Australia will be submitted to PBRI
D. R&D support may be required to enable extension of best biosecurity practice.	ATTIA, AgriFutures Australia	Ongoing	

Strategy: Legislative and Regulatory Issues of Importance

Aligns with Strategy 1 of NPBS

ACTION	RESPONSIBLE PARTY	DUE DATE	CURRENT ACTIVITIES
A. Raise awareness that all states have a responsibility to practice good biosecurity under The Biosecurity Act 2015. Some states may have quite specific legislative approaches whilst others have a more general approach, eg. The General Biosecurity Obligation (in QLD), General Biosecurity Duty (NSW).	ATTIA, State Governments, Commonwealth, PHA	Ongoing	
B. States to inform industry and in turn industry to raise awareness with growers on each states legislative requirements in relation to pest reporting and management of neglected plantations.	ATTIA, State Governments, PHA	TBA	
C. Promote the implementation of Property Identification Codes (PICs) for the purpose of identifying land used for agricultural purposes and to enable traceability and information flow in the event of a biosecurity incursion.	ATTIA	Ongoing	ATTIA has put in a submission and circulated to their board. Been included in the last ATTIA newsletter. Many tea tree growers already have PICs due to mixed farming (farm animals) on the property.

Australian tea tree industry - biosecurity preparedness

This document represents the first industry biosecurity planning process undertaken for the Australian tea tree industry.

The following table (Table 5) has been populated with the High Priority Pests (HPP) of the tea tree industry. The aim of this table is to document the current preparedness documents and activities which are available and are currently being undertaken. This will allow industry, governments and RD&E agencies to better prepare for these HPP and align future activities as listed in the Biosecurity Implementation Table (Table 4).

Table 5. Documents and activities currently available for High Priority Pests of the tea tree industry[37]

COMMON NAME (SCIENTIFIC NAME)	NATIONAL DIAGNOSTIC PROTOCOL[38]	SURVEILLANCE PROGRAMS	FACT SHEETS[39]	CONTINGENCY PLAN	EPPRD CATEGORY	NATIONAL PRIORITY PEST	COLLABORATORS[40]
Invertebrates							
Coleoptera (beetles and weevils)							
Black twig borer, shot-hole borer *(Xylosandrus compactus)* (with wood rotting fungi including *Fusarium solani*)	Not developed	NAQS	Yes- Mango	Not developed	Not categorised	Not listed	Mango
Pathogens and nematodes							
Fungi							
Myrtle rust *Austropuccinia psidii* (exotic strains)	Draft	NAQS, NT	Yes- NSW DPI, Tas DPIPWE, ATTIA[41]	Yes- Nursery and Garden (2009)	Category 1	Yes- 15	Cutflower, Nursery and Garden, Plantation forest
Calonectria brassicae	Not developed	Not covered by a pest specific surveillance program	Not developed	Not developed	Not categorised	Not listed	No other affected parties

[37] Information presented has been taken from the National Plant Biosecurity Status Report 2017 and confirmed or updated through either Plant Health Committee, the Subcommittee on Plant Health Diagnostic Standards, the Subcommittee on National Plant Health Surveillance or other stakeholders

[38] Copies of these documents are available from planthealthaustralia.com.au/pidd

[39] Copies of these documents are available from planthealthaustralia.com.au/pidd

[40] Industries listed in this column identify these pests within their biosecurity plans. Pests listed as a High Priority Pest are indicated by HPP.

[41] dpi.nsw.gov.au/__data/assets/pdf_file/0011/573707/primefact-myrtle-rust.pdf, dpipwe.tas.gov.au/Documents/myrtle.pdf, teatree.org.au/myrtle_rust.php

COMMON NAME (SCIENTIFIC NAME)	NATIONAL DIAGNOSTIC PROTOCOL[38]	SURVEILLANCE PROGRAMS	FACT SHEETS[39]	CONTINGENCY PLAN	EPPRD CATEGORY	NATIONAL PRIORITY PEST	COLLABORATORS[40]
Leaf spot, stalk rot and root rot (*Calonectria pteridis*)	Not developed	Not covered by a pest specific surveillance program	Not developed	Not developed	Not categorised	Not listed	No other affected parties
Oomycetes							
Sudden oak death (*Phytophthora ramorum*)	NDP 5	QLD	Plantation Forestry, Nursery and Garden, Tea Tree	Nursery and Garden (2010)	Category 1	Yes- 16	Avocado, Truffle, Blueberry, Cutflower, Nursery and Garden, Nut, Plantation forest

The Australian Tea Tree Industry Association Biosecurity Statement

All EPPRD Parties are required under Clause 13 of the EPPRD to produce a Biosecurity Statement, the purpose of which is to provide acknowledgement of, and commitment to, risk mitigation measures and preparedness activities related to plant biosecurity. The Biosecurity Statement will inform all Parties of activities being undertaken by the Industry Party to meet this commitment. Parties are required to report to PHA each year any material changes to the content of, or the Party's commitment to, the Party's Biosecurity statement. Biosecurity Statements are included in Schedule 15 of the EPPRD, which can be found on the PHA website at planthealthaustralia.com.au/emergency-plant-pest-response-deed/

NATIONAL BIOSECURITY SYSTEM

What is biosecurity and why is it important?

Plant biosecurity is a set of measures which protect the economy, environment and community from the negative impacts of plant pests. A fully functional and effective biosecurity system is a vital part of the future profitability, productivity and sustainability of Australia's plant production industries and is necessary to preserve the Australian environment and way of life.

Plant pests are insects, mites, snails, nematodes or pathogens (diseases) that have the potential to adversely affect food, fibre, ornamental crops, bees and stored products, as well as environmental flora and fauna. For agricultural systems, if exotic pests enter Australia they can reduce crop yields, affect trade and market access, significantly increase costs to production and in the worst-case scenario, bring about the complete failure of a production system. Historical examples present us with an important reminder of the serious impact that exotic plant pests can have on agricultural production.

Australia's geographic isolation and lack of shared land borders have, in the past, provided a degree of natural protection from exotic plant pest threats. Australia's national quarantine system also helps to prevent the introduction of harmful exotic threats to plant industries. However, there will always be some risk of an exotic pest entering Australia, whether through natural dispersal (such as wind) or assisted dispersal as a result of increases in international tourism, imports and exports, mail and changes to transport procedures (e.g. refrigeration and containerisation of produce).

The plant biosecurity system in Australia

Australia has a unique and internationally recognised biosecurity system to protect our plant production industries and the natural environment against new pests. The system is underpinned by a cooperative partnership between plant industries and all levels of government.

The framework for managing the cooperative partnership for delivering an effective plant biosecurity system is built on a range of strategies, policies and legislation, such as the Intergovernmental Agreement on Biosecurity (IGAB) and the National Plant Biosecurity Strategy (NPBS). These not only provide details about the current structure but provide a vision of how the future plant biosecurity system should operate.

Australia's biosecurity system has been subject to several reviews in recent times, with the recommendations recognising that a future-focused approach is vital for maintaining a strong and resilient biosecurity system that will protect Australia from new challenges. As a result, there is a continuous improvement from industry and governments to Australia's plant biosecurity system, with the key themes including:

- Targeting what matters most, including risk-based decision making and managing biosecurity risks across the biosecurity continuum (pre-border, border and post-border)
- Good regulation, including reducing regulatory burden and having effective legislation in place
- Better processes, including service delivery modernisation with electronic, streamlined systems
- Sharing the responsibility, including maintaining productive relationships with all levels of government, primary industries and the wider Australian public

- Maintaining a capable workforce.

Through these themes, a focus on the biosecurity continuum better supports consistent service delivery offshore, at the border, and onshore, and provides an effective biosecurity risk management underpinned by sound evidence and technical justification.

The benefits of the modern biosecurity system are realised by industry, government and the community, with positive flow on effects to the economy more generally. This occurs through streamlined business processes, productivity improvements and reduced regulatory burden in a seamless and lower cost business environment, by emphasising risk-based decision making and robust partnerships.

Tea tree peak industry body

The Australian Tea Tree Industry Association (ATTIA Ltd) is the peak industry body for Australia's tea tree industry. They are a signatory to the EPPRD and are the key industry contact point if a suspect emergency plant pest affecting the tea tree industry is detected. For further information about ATTIA Ltd in relation to response procedures following the identification of a suspect exotic pest refer to page 60. For background information on the Australian tea tree industry, refer to page 65.

Plant Health Australia

Plant Health Australia (PHA) is the national coordinator of the government-industry partnership for plant biosecurity in Australia.

PHA is a not-for-profit, subscription-funded public company based in Canberra. PHA's main activities are funded from annual subscriptions paid by members. The Australian Government, state and territory governments and 39 plant industry organisations are all members of PHA and each meet one third of the total annual membership subscription. This tripartisan funding model ensures the independence of the company.

The company was formed to address priority plant health issues, and to work with all its members to develop an internationally outstanding plant health management system that enhances Australia's plant health status and the sustainability and profitability of plant industries. Through PHA, current and future needs of the plant biosecurity system can be mutually agreed, issues identified, and solutions to problems found. PHA's independence and impartiality allow the company to put the interests of the plant biosecurity system first and support a longer-term perspective.

For more information about PHA visit planthealthaustralia.com.au

The Biosecurity Plan

The *Biosecurity Plan for the Tea Tree Industry* (the biosecurity plan) was developed in consultation with the Australian Tea Tree Technical Expert Group (TEG) and Biosecurity Implementation Group (BIG), which consisted of plant health and biosecurity experts and industry representatives. These groups were coordinated by Plant Health Australia (PHA) and included representatives from ATTIA Ltd, relevant state and territory government agriculture agencies, research organisations, Rural Research and Development Corporations and PHA.

The biosecurity plan not only details exotic pest threats of the Australian tea tree industry but also contains information on the current mitigation and surveillance activities being undertaken and identifies contingency plans, fact sheets and diagnostic protocols that have been developed for pests relevant to the industry.

This biosecurity plan is a framework to coordinate biosecurity activities and investment for Australia's tea tree industry and to address the strengths and weaknesses in relation to industry's current biosecurity position. It provides a mechanism for industry, governments and stakeholders to better prepare for and respond to, incursions of pests that could have significant impacts on the Australian tea tree industry.

Biosecurity planning

Biosecurity planning provides a mechanism for the tea tree industry, government and other relevant stakeholders to actively determine pests of highest priority, analyse the risks they pose and put in place practices and procedures that would rapidly detect an incursion, minimise the impact if a pest incursion occurs and/or reduce the chance of pests becoming established. Effective industry biosecurity planning relies on all stakeholders, including government agencies, industry, and the public (Figure 1).

Ensuring the tea tree industry has the capacity to minimise the risks posed by pests, and to respond effectively to any pest threats is a vital step for the future sustainability and viability of the industry. Through this pre-emptive planning process, the industry will be better placed to maintain domestic and international trade and reduce the social and economic costs of pest incursions on both growers and the wider community. The information gathered during these processes provides additional assurance that the Australian tea tree industry is free from specific pests and has systems in place to control and manage biosecurity risks, which assists the negotiation of access to new overseas markets.

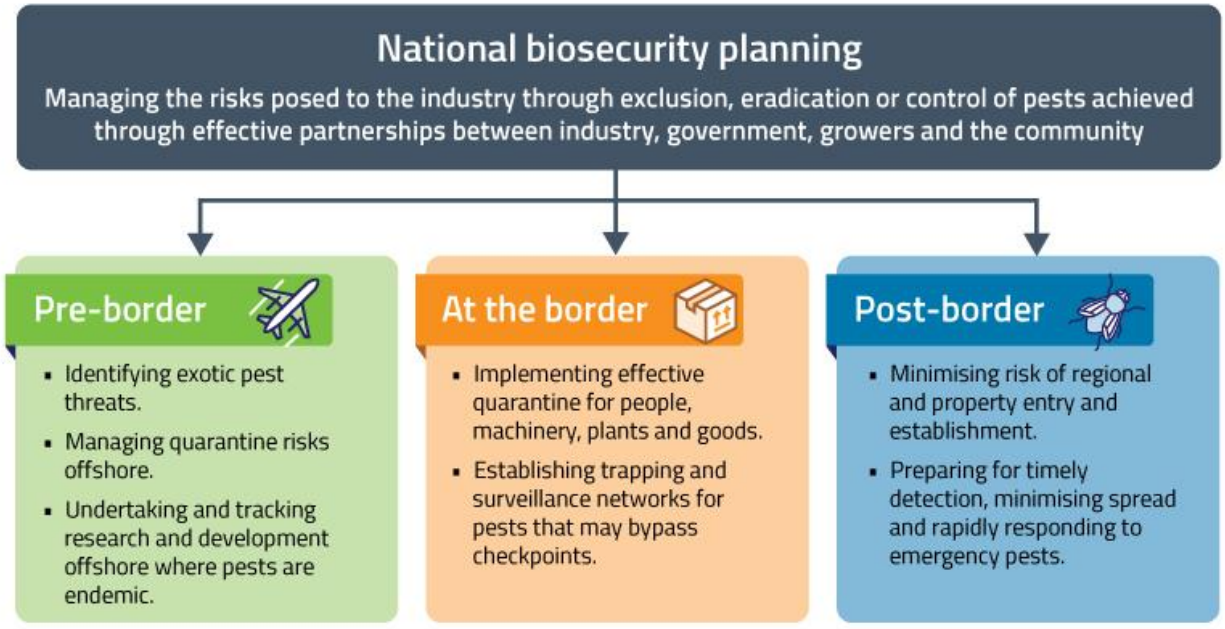

Figure 1. Industry biosecurity: a shared responsibility.

Biosecurity Plan development

With the assistance of the ATTIA Ltd, a Technical Expert Group (TEG) and a Biosecurity Implementation Group (BIG) were formed to work on the review of the Biosecurity Plan for the *Biosecurity Plan for the Tea tree Industry* (the biosecurity plan). These groups were coordinated by Plant Health Australia (PHA) and included representatives from ATTIA Ltd, relevant state and territory agriculture agencies and PHA (Table 6 and Table 7).

Key roles of the Technical Expert Group for the biosecurity plan development included:

- identifying and documenting key threats to the Australian tea tree industry
- confirming an agreed High Priority Pest (HPP) list.

Key roles of the Biosecurity Implementation Group for the biosecurity plan included:

- documenting pest-specific fact sheets, contingency plans, diagnostic protocols and surveillance programs for HPP
- documenting the roles and responsibilities of stakeholder groups
- developing a biosecurity implementation table for future biosecurity related work to be conducted over the life of this biosecurity plan.

Table 6. Members of the Technical Expert Group (TEG) and/or the Biosecurity Implementation Group (BIG)

NAME	ORGANISATION	AREA OF EXPERTISE	MEMBER OF TEG	MEMBER OF BIG
Angus Carnegie	NSW DPI	Pathology	✓	
Rosalie Daniel	NSW DPI	Pathology	✓	✓
Robert Dyason	ATTIA	Industry		✓
Peter Entwistle	NEAS	Entomology	✓	✓
Christine Horlock	QDAF	Pathology	✓	✓
Tony Larkman	ATTIA	Industry	✓	✓
Craig Maddox	NSW DPI	Entomology	✓	✓
Geoff Pegg	NSW DPI	Pathology	✓	✓
John Seccombe	ATTIA	Industry		✓
Dave Martin	ATTIA	Industry		✓
Michael Flanagan	ATTIA	Industry		✓
Glenn Donnelly	ATTIA	Industry		✓
Trevor Dunmall	PHA	Biosecurity		✓
Victoria Ludowici	PHA	Biosecurity	✓	✓

Table 7. Scientists and others who contributed information for the review of the biosecurity plan[42]

NAME	ORGANISATION	AREA OF EXPERTISE
Mike Hodda	CSIRO	Nematology

Review processes

With the support of the relevant industry bodies and PHA this plan should be reviewed on a 5-yearly basis. The review process will ensure:

- Threat Summary Tables are updated to reflect current knowledge
- pest risk assessments are current
- changes to biosecurity processes and legislation is documented
- contact details and references to available resources are accurate

In addition to the formal review process above, the document should be reviewed/revisited annually by the Australian Tea Tree Biosecurity Reference Panel comprised of industry, government and PHA representatives and scientific experts to ensure currency and relevance; and to monitor progress with implementation. As an example, the industry biosecurity priorities identified within the plan could feed directly into industry RD&E priority setting activities on an annual basis.

Opportunities to make out-of-session changes to the biosecurity plan, including the addition/subtraction of high priority pests or changes to legislation are currently being investigated. Such changes would need to include consultation and agreement of all stakeholders. This flexibility will increase the plan's currency and relevance.

[42] These people did not attend the technical expert group or biosecurity implementation group meetings but were approached for assistance during the biosecurity plan review process.

THREAT IDENTIFICATION AND PEST RISK ASSESSMENTS

Introduction

This section identifies high risk exotic pest threats to the Australian tea tree industry, and presents a framework for assessing the potential economic, social and environmental impacts associated with each threat. This part of the biosecurity plan uses a nationally consistent and coordinated approach to threat identification and risk assessment to provide a strong base for future risk management in the Australian tea tree industry.

By identifying key threats, a pre-emptive approach may be taken to risk management. Under this approach, mechanisms can be put into place to increase our response effectiveness if pest incursions occur. One such mechanism is the EPPRD that has been negotiated between PHA's government and industry members. The EPPRD ensures reliable and agreed funding arrangements are in place in advance of EPP incursions, and assists in the response to EPP incursions, particularly those identified as key threats.

Identification of exotic High Priority Pests will also assist in the implementation of effective grower and community awareness campaigns, targeted biosecurity education and training programs for growers and diagnosticians, and development of pest-specific incursion response plans.

Established pests and weeds of biosecurity significance have also been considered in this plan. It is well understood that good biosecurity practice is beneficial for the ongoing management of established pests and weeds, as well as for surveillance and early detection of exotic pests. Established pests and weeds cause ongoing hardships for growers and have been listed with the support of industry and government in recognition that they need a strategic, consistent, scientific and risk-based approach to better manage these pests and weeds for the tea tree industry.

Exotic pests of the Australian tea tree industry

Threat identification

Information on exotic pest threats to the Australian tea tree industry described in this document came from a combination of:

- past records
- existing industry protection plans
- industry practice and experience
- relevant published literature
- local industry and overseas research
- specialist and expert judgment

At this time, only invertebrate pests (insects, mites and molluscs), nematodes and pathogens (disease causing organisms) have been identified for risk assessment, as these pests are covered under national agreed arrangements, under the EPPRD. If exotic weeds were to be included in the EPPRD then this would be revisited through future reviews of the plan.

Pest risk assessments

The assessment process used in this biosecurity plan was developed in accordance with the International Standards for Phytosanitary Measures (ISPM) No. 2 and 11 [Food and Agriculture Organization of the United Nations (FAO), 2004; 2007]. A summary of the pest risk analysis protocol followed in this biosecurity plan is shown in Table 8, and the complete protocol used for pest risk analysis can be found on the PHA website.

While there are similarities in the ranking system used in this document and the Biosecurity Import Risk

Analysis (BIRA) process followed by the Department of Agriculture (DA), there are differences in the underlying methodology and scope of consideration that may result in different outcomes between the two assessment systems. This includes different guidance to assignment of qualitative probabilities.

Modifications of the DA (Department of Agriculture Fisheries and Forestry, 2011) protocol have been made to suit the analysis required in the biosecurity plan development process, including, but not limited to:

- Entry potential: The determination of entry potential in this biosecurity plan takes into account multiple possible pathways for the legal importation of plant material as well as illegal pathways, contamination and the possibility of introduction through natural means such as wind. Therefore, the scope is wider than that used by the DA in the BIRA process, which only considers legal importation of plants or plant commodities.
- Potential economic impact of pest establishment in this document only takes into account the impacts on the Australian tea tree industry. The DA BIRA process has a wider scope, including the impacts on all of Australia's plant industries, trade, the environment, social amenity and public health.
- Risk potential and impacts: The categories used in this biosecurity plan for describing the entry, establishment, spread, and potential economic impact (see 'Description of terms used in pest risk tables', page 58) differs in comparison to that used in the DA BIRA process.

Table 8. Summary of pest risk assessment process used in biosecurity plans.

Step 1	Clearly identify the pest	• Generally, pest defined to species level • Alternatively, a group (e.g. family, genus level) can be used • Sub-species level (e.g. race, pathovar, etc.) may be required
Step 2	Assess entry establishment and spread likelihoods	• Assessment based on current system and factors • Negligible, low, medium, high or unknown ratings
Step 3	Assess the likely consequences	• Primarily based on likely economic impact to industry based on current factors • Negligible, low, medium, high, extreme or unknown ratings
Step 4	Derive overall risks	• Entry, establishment and spread likelihoods are combined to generate an overall likelihood score • Likelihood score combined with the likely economic impact to generate an overall risk score
Step 5	Review the risks	• Risk ratings should be reviewed with the biosecurity plan

The objective of risk assessment is to clearly identify and classify biosecurity risks and to provide data to assist in the evaluation and mitigation of these risks. Risk assessment involves consideration of the sources of risk, their consequences, and the likelihood that those consequences may occur. Factors that affect the consequences and likelihood may be identified and addressed via risk mitigation strategies.

Risk assessment may be undertaken to various degrees of refinement, depending on the risk information and data available. Assessment may be qualitative, semi-quantitative, quantitative, or a combination of these. The complexity and cost of assessment increases with the production of more quantitative data. It is often more practical to first obtain a general indication of the level of risk through qualitative risk assessment, and if necessary, undertake more specific quantitative assessment later [Australian Standard/New Zealand Standard (AS/NZS) ISO 31000, 2009].

Ranking pest threats

Key questions required for ranking the importance of pests include the following:

- What are the probabilities of entry into Australia, establishment and spread, for each pest?
- What are the likely impacts of the pest on cost of production, overall productivity and market access?

- How difficult is each pest to identify and control and/or eradicate?

The Threat Summary Tables (TST) (Appendix 2: Threat Summary Tables) present a list of potential plant pest threats to the Australian tea tree industry and provide summarised information on entry, establishment and spread potential, the economic consequences of establishment and eradication potential (where available). The most serious threats from the TST were identified through a process of qualitative risk assessment and are detailed in the HPP list (Table 1).

> This document considers all potential pathways by which a pest might enter Australia, including natural and assisted spread (including smuggling). This is a broader view of potential risk than the BIRA conducted by the Department of Agriculture ,which focuses only on specific regulated import pathways.

When a pest that threatens multiple industries is assessed, the entry, establishment and spread potentials take into account all known factors across all host industries. This accurately reflects the ability of a pest to enter, establish and spread across Australia and ultimately results in different industries, and their biosecurity plans, sharing similar pest ratings. However, the economic impact of a pest is considered at an industry specific level (i.e. only for the Australian tea tree industry), and therefore this rating may differ between biosecurity plans.

Description of terms used in pest risk tables

The descriptions below relate to terms in Table 1 and elsewhere in the document.

Entry potential

Negligible	The probability of entry is extremely low given the combination of all known factors including the geographic distribution of the pest, quarantine practices applied, probability of pest survival in transit and pathways for pest entry and distribution to a suitable host.
Low	The probability of entry is low, but clearly possible given the expected combination of factors described above.
Medium	Pest entry is likely given the combination of factors described above.
High	Pest entry is very likely and potentially frequent given the combination of factors described above.
Unknown	The pest entry potential is unknown or very little of value is known.

Establishment potential

Negligible	The pest has limited potential to survive and become established within Australia given the combination of all known factors.
Low	The pest has the potential to survive and become established in approximately one-third or less of the range of hosts. The pest could have a low probability of contact with susceptible hosts.
Medium	The pest has the potential to survive and become established in between approximately one-third and two-thirds of the range of hosts.
High	The pest has potential to survive and become established throughout most or all of the range of hosts. Distribution is not limited by environmental conditions that prevail in Australia. Based upon its current world distribution, and known conditions of survival, it is likely to survive in Australia wherever major hosts are grown.
Unknown	The establishment potential of the pest is unknown or very little of value is known.

Spread potential

Negligible	The pest has very limited potential for spread in Australia given the combination of dispersal mechanisms, availability of hosts, vector presence, industry practices and geographic and climatic barriers.
Low	The pest has the potential for natural or assisted spread to susceptible hosts within Australia yet is hindered by a number of the above factors
Medium	The pest has an increased likelihood of spread due to the above factors
High	The natural spread of the pest to most production areas is largely unhindered and assisted spread within Australia is also difficult to manage
Unknown	The spread potential is unknown or very little of value is known.

Economic impact

Negligible	There are very minor, often undetectable, impacts on production with insignificant changes to host longevity, crop quality, production costs or storage ability. There are no restrictions to market access.
Very low	There are minor, yet measurable, impacts on production including either host longevity, crop quality, production costs or storage ability. There are no restrictions to market access.
Low	There are measurable impacts to production including either host mortality, reduction in yield, production costs, crop quality, storage losses, and/or minimal impacts on market access.
Medium	There are significant impacts on production with either host mortality, reduction in yield, production costs, crop quality, storage losses, and/or moderate impacts on market access.
High	There are severe impacts on production including host mortality and significant impacts on either crop quality or storage losses, and/or severe impacts on market access.
Extreme	There is extreme impact on standing crop at all stages of maturity, with high host mortality or unmanageable impacts to crop production and quality, and /or extreme, long term, impacts on market access.
Unknown	The economic potential of the pest is unknown or very little of value is known.

References

AS/NZS ISO 31000:2009 Risk management - Principles and guidelines. Standards Australia, Sydney, and Standards New Zealand, Wellington.

DAFF (2011) Import Risk Analysis Handbook 2011. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.

FAO (2004) Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms. International Standards for Phytosanitary Measures No. 11. Secretariat of the International Plant Protection Convention, Food and Agriculture Organization of the United Nations, Rome.

FAO (2007) Framework for pest risk analysis. International Standards for Phytosanitary Measures No. 2. Secretariat of the International Plant Protection Convention, Food and Agriculture Organization of the United Nations, Rome.

RISK MITIGATION AND PREPAREDNESS

Introduction

There are a number of strategies that can be adopted to help protect and minimise the risks of Emergency Plant Pests under International Plant Protection Convention (IPPC) standards (ippc.int/standards) and Commonwealth and State/Territory legislation.

Many pre-emptive practices can be adopted to reduce the risk of exotic pest movement for the Australian tea tree industry (Figure 2). Such risk mitigation and preparedness practises are the responsibility of governments, industry and the community.

A number of key risk mitigation areas are outlined in this guide, along with summaries of the roles and responsibilities of the Australian Government, state/territory governments, and tea tree industry members. This section is to be used as a guide outlining possible activities that may be adopted by industry and growers to mitigate the risk and prepare for an incursion response. Each grower will need to evaluate the efficacy of each activity for their situation.

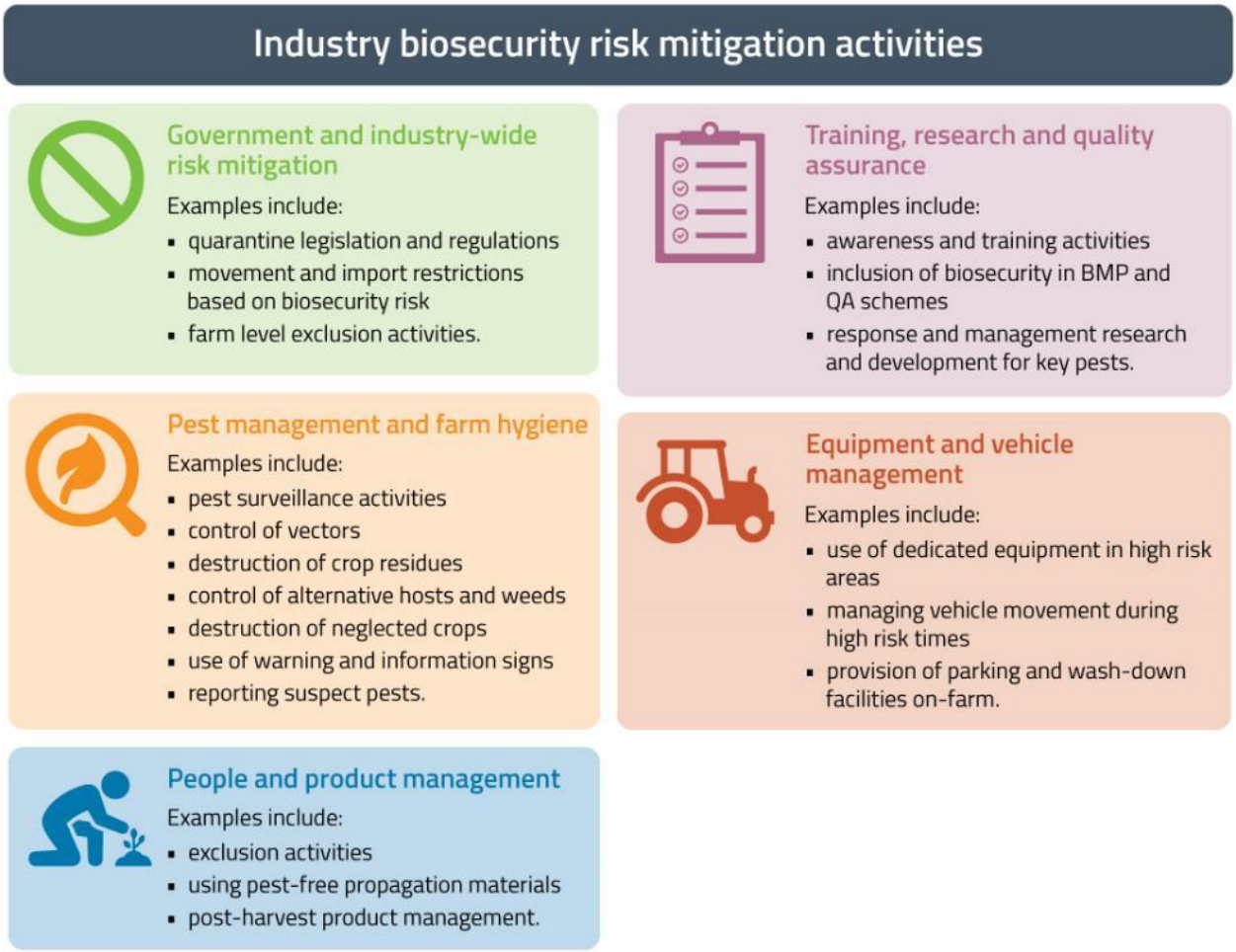

Figure 2. Examples of biosecurity risk mitigation activities.[43]

[43] BMP refers to Best Management Practise.

Barrier quarantine

Barrier quarantine refers to the biosecurity measures implemented at all levels of the tea tree industry including national, state, regional and farm levels.

National level – importation restrictions

The Department of Agriculture (DA) is the Australian Government department responsible for maintaining and improving international trade and market access opportunities for agriculture, fisheries, forestry and food industries. DA achieves this through:

- establishment of scientifically-based quarantine policies
- provision of effective technical advice and export certification services
- negotiations with key trading partners
- participation in multilateral forums and international sanitary and phytosanitary (SPS) standard-setting organisations
- collaboration with portfolio industries and exporters.

DA is responsible for developing biosecurity (i.e. SPS) risk management policy and reviewing existing quarantine measures for the importation of live animals and plants, and animal and plant products. In particular, DA undertakes import risk analyses to determine which products may enter Australia, and under what quarantine conditions. DA also consults with industry and the community, conducting research and developing policy and procedures to protect Australia's animal and plant health status and natural environment. In addition, DA assists Australia's export market program by negotiating other countries' import requirements for Australian animals and plants. Further information can be found at agriculture.gov.au.

The administrative authority for national quarantine is vested in DA under the Australian Government *Biosecurity Act 2015*. Quarantine policies are developed through the Biosecurity Import Risk Analysis (BIRA) process. This process is outlined in the BIRA Guidelines 2016 (Department of Agriculture and Water Resources, 2016). DA maintains barrier quarantine services at all Australian international sea and airports, and in the Torres Strait region. The management of quarantine policy, as it relates to the introduction into Australia of fruit, seed, or other plant material, is the responsibility of DA.

The Australian Biosecurity Import Conditions Database (BICON) contains the current Australian import conditions for more than 20,000 foreign plants, animal, mineral and human products and is the first point of access to information about Australian import requirements for a range of commodities. It can be used to determine if a commodity intended for import to Australia requires a quarantine import permit and/or treatment or if there are any other quarantine prerequisites. The cases listed on BICON for *Meleleuca* are included below (Table 9). BICON can be accessed at agriculture.gov.au/import/bicon. For export conditions see the Manual of Importing Country Requirements (MICoR) database at agriculture.gov.au/micor/plants.

The Australian Government is responsible for the inspection of machinery and equipment being imported into Australia. Any machinery or equipment being imported into Australia must meet quarantine requirements. If there is any uncertainty, contact DA on (02) 6272 3933 or 1800 020 504, or visit the website at agriculture.gov.au/biosecurity/import.

The World Trade Organization (WTO) SPS Agreement facilitates international trade while providing a framework to protect the human, animal and plant health of WTO members. SPS measures put in place must minimise negative effects on trade while meeting an importing country's appropriate level of protection. For plant products, these measures are delivered through the IPPC standard setting organisations and collaboration with portfolio industries and exporters. For more information on the IPPC visit ippc.int.

Table 9. Product types for which import conditions are listed in BICON (as at January 2019)[44]

CROP	PRODUCT TYPE
Melaleuca	Timber and timber products

State and regional level – movement restrictions

The ability to control movement of materials that can carry and spread tea tree pests is of high importance. Each state/territory has quarantine legislation in place to control the importation of tea tree material interstate and intrastate, and to manage agreed pests if an incursion occurs (Table 10). Further regulations have been put in place in response to specific pest threats and these are regularly reviewed and updated by state/territory authorities and the Subcommittee for Domestic Quarantine and Market Access (Subcommittee for Domestic Quarantine and Market Access: SDQMA).

Moving plant material between states/territories generally requires permits from the appropriate authority, depending on the plant species and which territory/state the material is being transferred to/from. Moving plant material intrastate may also require a permit from the appropriate authority. Information on pre-importation inspection, certification and treatments and/or certification requirements for movement of tea tree and tea tree related commodities can be obtained by contacting your local state or territory agriculture department directly (Table 10), or through the SDQMA website domesticquarantine.org.au which lists relevant contacts in each state/territory as well as Interstate Certification Assurance (ICA) documents relating to each state/territory.

The movement of farm vehicles and equipment between states is also restricted because of the high risk of inadvertently spreading pests. Each state/territory has quarantine legislation in place governing the movement of machinery, equipment and other potential sources of pest contamination. Further information can be obtained by contacting your local state/territory Department of Agriculture (Table 10).

[44] Please note, this is a summary only. Conditions change overtime and BICON (agriculture.gov.au/import/bicon), or the Department of Agriculture will need to be consulted to confirm the specific conditions that apply to a given situation.

Table 10. Interstate and interregional movement of plant products – legislation, quarantine manuals and contact numbers.

STATE	ADMINISTERING AUTHORITY	LEGISLATION	LINKS TO QUARANTINE MANUAL	PHONE
ACT	Environment ACT environment.act.gov.au	*Plant Disease Act 2002* *Pest Plants and Animals Act 2005*	See NSW conditions	13 22 81
NSW	Department of Primary Industries dpi.nsw.gov.au	*Biosecurity Act 2015* Biosecurity Regulation 2017 *Biosecurity Order (Permitted Activities) 2017* and other supporting legislation such as Control Orders	dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases	(02) 6391 3384
NT	Department of Primary Industry and Fisheries dpir.nt.gov.au/	*Plant Health Act 2008* Plant Health Regulations 2011	nt.gov.au/industry/agriculture/food-crops-plants-and-quarantine/plants-and-quarantine	(08) 8999 2118
QLD	Biosecurity Queensland, a part of the Department of Agriculture and Fisheries, Queensland daf.qld.gov.au/business-priorities/biosecurity	*Biosecurity Act 2014* Biosecurity Regulation 2016	daf.qld.gov.au/plants/moving-plants-and-plant-products	13 25 23[45] (07) 3404 6999[46]
SA	Primary Industries and Regions SA pir.sa.gov.au	*Plant Health Act 2009* Plant Health Regulations 2009	pir.sa.gov.au/biosecurity/plant_health/importing_commercial_plants_and_plant_products_into_south_australia	(08) 8207 7820
TAS	Department of Primary Industries, Parks, Water and Environment dpipwe.tas.gov.au	*Plant Quarantine Act 1997* Weed Management Act 1999	dpipwe.tas.gov.au/biosecurity-tasmania/plant-biosecurity/plant-biosecurity-manual	1300 368 550
VIC	Department of Jobs, Precincts and Regions djpr.vic.gov.au	*Plant Biosecurity Act 2010* Plant Biosecurity Regulations 2016	agriculture.vic.gov.au/psb	13 61 86
WA	Department of Primary Industries and Regional Development agric.wa.gov.au/	*Biosecurity and Agricultural Management Act 2007*		(08) 9334 1800

[45] Within QLD
[46] Interstate

New South Wales

Information on pre-importation inspection, certification and treatment requirements may be obtained from NSW DPI Regulatory Services by phone 02 6391 3384 or by visiting the NSW Department of Primary Industries website dpi.nsw.gov.au/aboutus/about/legislation-acts/plant-diseases.

Northern Territory

Administrative authority for regional quarantine in the Northern Territory (NT) is vested in the Department of Primary Industry and Resources (DPIR) under the Plant Health Act 2008 and Plant Health Regulations 2011. The Act enables notifiable pests to be gazetted, quarantine areas to be declared and inspectors appointed to carry out wide ranging control and/or eradication measures. Plant import requirements for particular pests, plants or plant related materials are identified in the Regulations. Further information on NT import requirements and treatments can be obtained by contacting NT Quarantine on (08) 8999 5511 or email quarantine@nt.gov.au.

For more information refer to the DPIR website (dpir.nt.gov.au/).

Queensland

Information on specific pre-importation inspection, treatments and/or certification requirements for movement of any fruit or plant material into Queensland, as well as maps of pest quarantine areas, may be obtained from the Biosecurity Queensland part of the QDAF website (business.qld.gov.au/industries/farms-fishing-forestry/agriculture/land-management/moving-plant-soil).

Further details can be obtained from the QDAF Customer Service Centre (13 25 23 within Queensland, or phone 07 3404 6999 or fax 07 3404 6900 interstate).

South Australia

Information on pre-importation inspection, certification and treatments and/or certification requirements for movement of fruit or plant material in South Australia (SA) may be obtained from Biosecurity SA - Plant Health by phone (08) 8207 7820 or fax (08) 8207 7844. Further information can be found at pir.sa.gov.au/biosecurity/plant_health.

Primary Industries and Regions South Australia (PIRSA) have strict regulations and requirements regarding the entry of plant material (fruit, vegetables, flowers, plants, soil and seeds) into the State.

For further information on import conditions consult the Plant Quarantine Standard (pir.sa.gov.au/biosecurity/plant_health/importing_commercial_plants_and_plant_products_into_south_australia).

Tasmania

Information on specific pre-importation inspection, treatments and/or certification requirements for movement of any fruit or plant material into Tasmania may be obtained from the Department of Primary Industries, Parks, Water and Environment (DPIPWE) Biosecurity website (dpipwe.tas.gov.au/biosecurity) or by phoning 1300 368 550.

General and specific import conditions apply to the importation of plant material into Tasmania to prevent the introduction of pests and diseases into the State. Plants and plant products must not be imported into Tasmania unless State import requirements are met and a Notice of Intention to import has been provided to a Biosecurity Tasmania inspector not less than 24 hours prior to the importation.

For further information on import conditions consult the Plant Quarantine Manual (dpipwe.tas.gov.au/biosecurity-tasmania/plant-biosecurity/plant-biosecurity-manual).

Victoria

The movement into Victoria of plants and plant products may be subject to a prohibition, or to one or more conditions which may include chemical treatments. These prohibitions and conditions are described on the Department of Jobs, Precincts and Regions (DJPR) website (see link in Table 10). Some items may need to be presented to a DJPR inspector or an accredited business, for checking of details such as correct certification, labelling or treatment.

Further information on pre-importation inspection, certification and treatments and/or certification

requirements for movement of fruit or plant material into or within Victoria may be obtained from DJPR on the web at agriculture.vic.gov.au/psb or by phone 136 186.

Western Australia

The lead agency for agricultural biosecurity in Western Australia is the Department of Primary Industries and Regional Development (DPIRD). Western Australia is naturally free from a large number of pests and diseases that are present in many other parts of the world. WA's geographical isolation in conjunction with a robust plant biosecurity system including border and intrastate regulations, industry and public awareness campaigns and surveillance programs maintains this status.

There are general and specific legislative requirements which underpin Western Australian plant biosecurity. Amongst other things the legislation regulates movement of potential carriers (such as plant material, honey, machinery, seeds etc.) into and within the state.

General conditions include (but are not limited to the following):

- The requirement for all potential carriers to be presented to an inspector for inspection upon arrival in WA
- Soil is prohibited entry and imported goods, including containers, must be free from soil
- Freedom from pests and diseases of quarantine concern to WA

In addition to the general requirements, specific requirements are also in place for movement into and within the state.

For further information on requirements contact Quarantine WA on (08) 9334 1800 or fax (08) 9334 1880.

Farm level – exclusion activities

A significant risk of spreading pests onto farms arises when propagation material, people, machinery and equipment move from property to property and from region to region. It is the responsibility of the industry and the owner/manager of each property to ensure these risks are minimised.

It is in the interests of industry to encourage and monitor the management of risk at the farm level, as this will reduce the probability of an incursion and increase the probability of early detection. This should in turn reduce the likelihood of a costly incident response, thereby reducing costs to industry, government and the community.

One major way this can be achieved is through management of industry biosecurity at the farm level using exclusion practices. Further detail on potential strategies is included in the Farm Biosecurity section (page 79). The Australian tea tree industry is already a strong supporter of farm biosecurity; but should continue to further extend this message of promoting good farm hygiene in a wide range of ways.

Surveillance

Surveys enhance prospects for early detection, minimising costs of eradication and are necessary to meet the treaty obligations of the WTO SPS Agreement with respect to the area freedom status of Australia's states, territories and regions.

The SPS Agreement gives WTO members the right to impose SPS measures to protect human, animal and plant health provided such measures do not serve as technical barriers to trade. In other words, for countries (such as Australia) that have signed the SPS Agreement, imports of food, including fresh fruit and tea tree, can only be restricted on proper, science-based quarantine grounds. Where quarantine conditions are imposed, these will be the least trade restrictive measures available that meet Australia's appropriate level of quarantine protection. The SPS Agreement also stipulates that claims of area freedom must be supported by appropriate information, including evidence from surveillance and monitoring activities. This is termed "evidence of absence" data and is used to provide support that we have actively looked-for pests and not found them.

ISPM 6 (ippc.int/sites/default/files/documents/20140528/spec_61_revispm6_2014-05-28_201405281352--150.18%20KB.pdf) provides international guidelines for structured pest surveys. Structured pest survey planning and implementation depends on the risk involved, the resources available, and the requirements of

trading partners (particularly when Australia wishes to access overseas markets). The intensity and timing of surveys also depend on the spread characteristics of the pest and the costs of eradication.

Early detection of an exotic pest incursion can significantly increase the likelihood of a successful eradication campaign and reduce the associated costs. Effective surveillance plays a critical role in working toward this goal. Surveillance can be either targeted toward specific pests, or general in nature. General non-targeted surveillance is based on recognising normal versus suspect plant material. Targeted surveillance is important for establishing whether particular pests are present in each state or region, and if so, where these occur.

Industry personnel can provide very effective early detection of new or unusual symptoms through their normal management practices (i.e. 'passive surveillance'), provided individuals are aware of what to look for and of reporting procedures. Consultants and crop scouts can provide valuable information as they are regularly in the field, and hence can observe any unusual pest activity or symptoms on plants.

National surveillance programs

The Department of Agriculture (DA) maintains barrier quarantine services at all international ports and in the Torres Strait region. DA also surveys the northern coast of Australia, offshore islands and neighbouring countries for exotic pests that may have reached the country through other channels (e.g. illegal vessel landings in remote areas, bird migrations, wind currents) as part of the Northern Australia Quarantine Strategy (NAQS). NAQS surveillance programs relevant to the tea tree industry are listed in Table 11.

State surveillance programs

State level surveillance depends on the participation of all stakeholder groups, particularly state/territory agriculture departments, industry representative groups, agri-business and growers.

The state/territory agriculture department can provide:

- planning and auditing of surveillance systems
- coordination of surveillance activities between industry and interstate groups
- diagnostic services
- field diagnosticians for special field surveillance
- surveillance on non-commercial sites
- liaison services with industry members
- communication, training and extension strategies with industry
- biosecurity training
- reporting services to all interested parties (DA, national bodies, trading partners and industry).

Various pest surveillance programs are managed by the DA and the state/territory agriculture departments. Many state/territory agriculture departments run general surveillance programs whereby suspect samples can be forwarded and diagnosed for the presence of exotic pests free of charge. Official surveillance programs that target pests of the tea tree industry (exotic or those under official control in a region or state/territory) are shown in Table 11.

Table 11. Official surveillance programs that target pest of the tea tree industry (as at January 2019)[47]

SURVEILLANCE PROGRAM	PESTS TARGETED	HOSTS TARGETED
Australian Government		
Northern Australia Quarantine Strategy – pest and disease surveys	157 high priority exotic pests, diseases and weeds including *Xylosandrus compactus, Austropuccinia psidii* (exotic strains)	Multiple surveillance programs of tropical horticultural and agricultural species.

[47] Information presented has been taken from the National Plant Biosecurity Status Report 2017 and confirmed or updated in January 2019 by the Subcommittee on National Plant Health Surveillance (subcommittee of the Plant Health Committee)

SURVEILLANCE PROGRAM	PESTS TARGETED	HOSTS TARGETED
New South Wales		
Greater Sydney Local Land Services Periurban Surveillance Program	Various, including tomato potato psyllid (*Bactericera cockerelli*), brown marmorated stink bug (*Halyomorpha halys*), Asian citrus psyllid (*Diaphorina citri*), African citrus psyllid (*Trioza erytreae*) and glassy winged sharpshooter (*Homalodisca vitripennis*)	Multiple plant hosts in periurban landscape, including community gardens
National Plant Health Surveillance Program – multi pest surveillance	Multiple, including glassy winged sharpshooter (*Homalodisca vitripennis*), *Xylella fastidiosa*, fire blight (*Erwinia amylovora*), brown marmorated stink bug (*Halyomorpha halys*), exotic mites (including *Brevipalpus* spp., *Aceria granati*), Asian citrus psyllid (*Diaphorina citri*), African citrus psyllid (*Trioza erytreae*), huanglongbing (*Candidatus* Liberibacter asiaticus), citrus canker (*Xanthomonas axonopodis* subsp. *citri*), and invasive ants (*Solenopsis* spp., *Wasmannia auropunctata*, *Anoplolepis gracilipes*)	Multiple plant hosts around Ports of Sydney, Newcastle and Wollongong
Northern Territory		
National Plant Health Surveillance Program	Glassy winged sharpshooter (*Homalodisca vitripennis*)	Multiple
National Plant Health Surveillance Program	Red imported fire ant (*Solenopsis invicta*), electric ant (*Wasmannia auropunctata*), yellow crazy ant (*Anoplolepis gracilipes*)	Nursery stock
Queensland		
Grow Help Australia diagnostic service project	All pests and pathogens that can affect horticultural crops, national parks, gardens, hobby growers and home gardeners. Commonly encountered pathogens include *Phytophthora* spp., *Fusarium* spp., *Colletotrichum* spp., *Alternaria* spp., *Rhizoctonia* spp., *Pythium* spp., *Ralstonia* spp., *Erwinia* spp. and viruses	Fruit, vegetable and ornamental
National Electric Ant Eradication Program	*Wasmannia auropunctata*	Amenity and environment

SURVEILLANCE PROGRAM	PESTS TARGETED	HOSTS TARGETED
National Plant Health Surveillance Program	A range of exotic timber and forest pests, including sugarcane longhorn beetle (*Dorysthenes buqueti*), Asian and citrus longhorn beetle (*Anoplophora* spp.), lychee longicorn beetle (*Aristobia testudo*), lateral-banded mango longhorn beetle (*Batocera rubus*), sawyer beetles (*Monochamus* spp.), drywood longicorn beetle (*Stromatium barbatum*), ambrosia beetles, bark beetles (*Ips* spp.), pine beetles bark beetles (*Dendroctonus* spp.), wood wasps (Siricid wasps e.g. *Uroceris gigas*). Exotic fruit flies (*Bactrocera*, *Zeugodacus* and *Ceratitis* spp.), gypsy moths (*Lymantria* spp.), Pierce's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Multiple
National Red Imported Fire Ant Eradication Program	*Solenopsis invicta*	Amenity and environment
South Australia		
National Plant Health Surveillance Program	Glassy winged sharpshooter (*Homalodisca vitripennis* and *Homalodisca coagulata*)	*Vitis vinifera*
Tasmania		
Myrtle rust surveillance	*Austropuccinia psidii*	Lophomyrtus and other susceptible Myrtaceae nursery plant hosts, targeted native forest, and Myrtaceae tree species.
National Plant Health Surveillance Program – glassy winged sharpshooter	Glassy winged sharpshooter (*Homalodisca vitripennis*)	Various hosts at nurseries and on urban pathways
Victoria		
National Plant Health Surveillance Program	Pierce's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Grapes
Western Australia		
Browsing ant surveillance	Browsing ant (*Lepisiota frauenfeldi*)	Environmental, urban areas

SURVEILLANCE PROGRAM	PESTS TARGETED	HOSTS TARGETED
National Plant Health Surveillance Program	Fire blight (*Erwinia amylovora*), huanglongbing (*Candidatus* Liberibacter asiaticus), citrus canker (*Xanthomonas axonopodis pv. citri*), citrus longicorn beetle (*Anoplophora chinensis*), red imported fire ants (*Solenopsis invicta*), Pierce's disease (*Xylella fastidiosa*), glassy winged sharpshooter (*Homalodisca vitripennis*)	Pome and citrus crops

Farm level pest monitoring

Farm level monitoring involves the participation and interaction of growers, agribusiness and industry representative groups. Examples of the surveillance activities that can be carried out by each of these groups are outlined in Figure 3. Conducting regular surveys of farms and nurseries provides the best chance of spotting new pests early and implementing eradication or management responses.

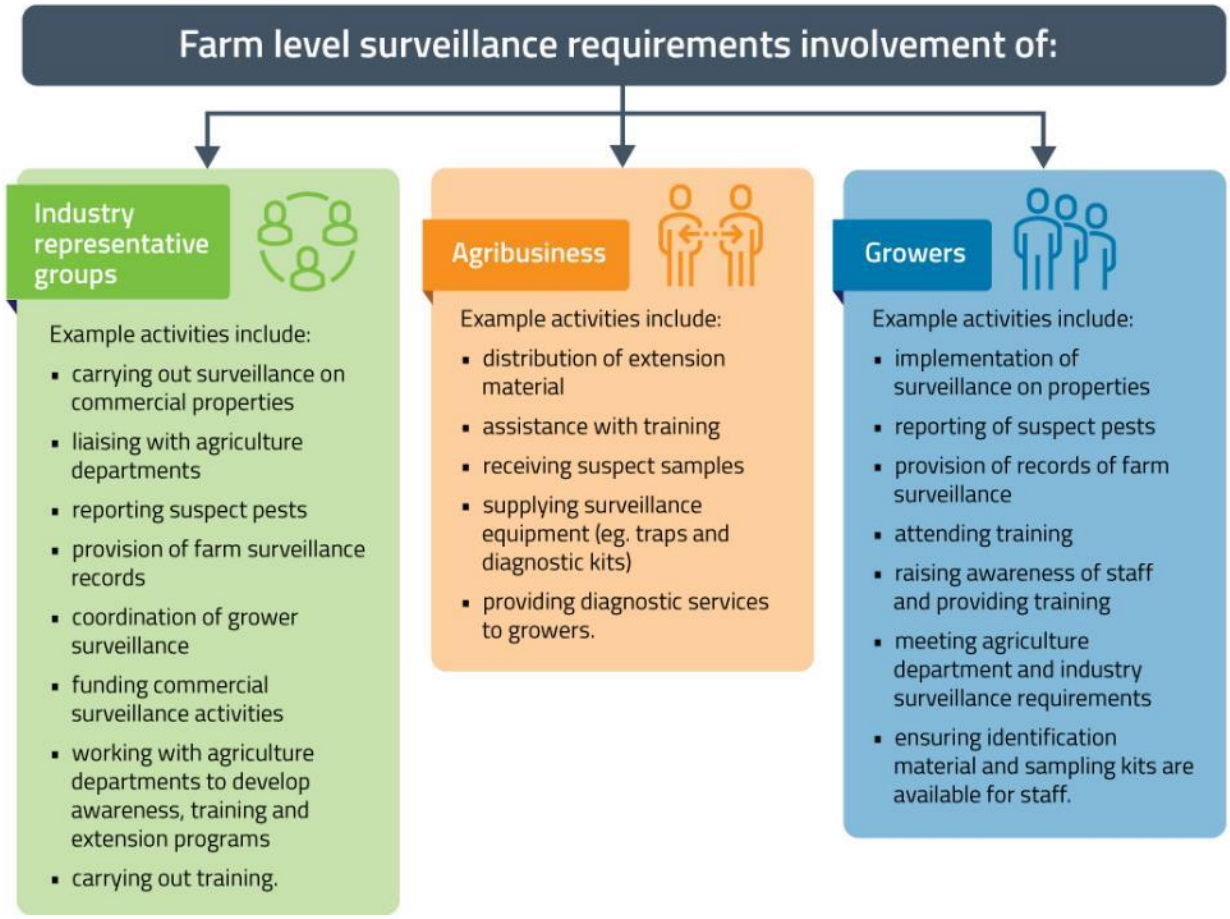

Figure 3. Examples of farm level surveillance activities.

Training

A key component of biosecurity preparedness is ensuring personnel engaged are suitable and effectively

trained for their designated roles in a response. Biosecurity preparedness training is the responsibility of all governments and industries, involved in the biosecurity system.

National EPP Training Program

PHA supports members in training personnel through the delivery of the National EPP Training Program. This program is focussed on ensuring personnel from the governments and peak industry bodies who will be involved in responses to EPPs have the skills and knowledge to effectively fulfil the roles and responsibilities of their parties, as signatories to the EPPRD. This covers a range of areas, from representatives on the national decision-making committees (i.e. the Consultative Committee on Emergency Plant Pests and the National Management Group) through to industry liaison personnel in the State Coordination or Local Control Centres.

In addition to face to face training delivered to members and the provision of simulation exercises, PHA also offers biosecurity training through the Biosecurity OnLine Training (BOLT) platform which houses a variety of eLearning courses relevant to plant biosecurity. Access to BOLT is free and open to any stakeholder interested in biosecurity and is available through planthealthaustralia.com.au/bolt.

For more information on the National EPP Training program, refer to planthealthaustralia.com.au/training.

Biosecurity Incident Standard Operating Procedures

The industry Biosecurity Incident Standard Operating Procedure (BISOP) is focussed on documenting the critical processes, functions, contact and authorisations information regarding how a specific organisation fulfils its roles and responsibilities during biosecurity incidents managed under the Emergency Plant Pest Response Deed (EPPRD). The completion of an organisation(s) BISOP involves:

- A detailed look at key decision points in a response put into the context of basic incursion scenarios and documentation of how the industry body will determine their view on those decision points (e.g. technical feasibility, approval to fund a Response Plan, input into communications).
- Documentation of the peak industry body record keeping processes and other internal processes to meet responsibilities under the EPPRD.

The BISOP workshop delivered by PHA also achieves the outcome of improved EPPRD awareness.

Awareness

Early reporting enhances the chance of effective control and eradication. Awareness activities raise the profile of biosecurity and exotic pest threats to the Australian tea tree industry, which increases the chance of early detection and reporting of suspect pests. Responsibility for awareness material lies with industry and government, with assistance from PHA as appropriate. Any unusual plant pest should be reported immediately to the relevant state/territory agriculture department through the Exotic Plant Pest Hotline (1800 084 881).

High priority plant pest threat-related documents

Pests listed in Table 1 have been identified as high priority threats to the tea tree industry by members of the TEG. They have been assessed as having high entry, establishment and spread potentials and/or a high economic impact. This list should provide the basis for the development of awareness material for the industry.

Further information on High Priority Pests

The websites listed below (Table 12) contain information on pests across most plant industries, including the tea tree industry.

Table 12. Sources of information on High Priority Pests for the tea tree industry.

SOURCE	WEBSITE
CABI – Crop Protection Compendium	cabi.org/cpc/
QDAF	business.qld.gov.au/industries/farms-fishing-forestry/agriculture/crop-growing/priority-pest-disease
Department of Agriculture	agriculture.gov.au
European and Mediterranean Plant Protection Organization (EPPO)	eppo.int/DATABASES/pqr/pqr.htm
Plant Health Australia (PHA)	planthealthaustralia.com.au/
Pest and Disease Image Library (PaDIL)	padil.gov.au/
University of California Statewide Integrated Pest Management (IPM) Program	ipm.ucdavis.edu/EXOTIC/exoticpestsmenu.html

Further information/relevant websites

A range of government and grower organisation details and websites for persons seeking further information on tea tree industry biosecurity (Table 13).

Table 13. Interstate and interregional movement of plant products – legislation, quarantine manuals and contact numbers.

AGENCY	WEBSITE/EMAIL	PHONE	ADDRESS
National			
Australian Tea Tree Industry Association	teatree.org.au/ ceo@attia.org.au	(02) 4017 1336	PO Box 903, Casino, NSW 2470
Department of Agriculture	agriculture.gov.au	(02) 6272 3933 1800 020 504	GPO Box 858 Canberra, ACT 2601
Plant Health Australia	planthealthaustralia.com.au biosecurity@phau.com.au	(02) 6215 7700	Level 1, 1 Phipps Cl Deakin, ACT 2600
New South Wales			
Department of Primary Industries	dpi.nsw.gov.au/biosecurity/plant	(02) 6391 3535	Locked Bag 21 Orange, NSW 2800
Queensland			
Biosecurity Queensland, a part of the Department of Agriculture and Fisheries, Queensland	daf.qld.gov.au info@daf.qld.gov.au	13 25 23[48] (07) 3404 6999[49]	41 George Street Brisbane, QLD 4000
Northern Territory			
Department of Primary Industry and Resources	dpir.nt.gov.au/about	(08) 8999 5511	Berrimah Farm, Makagon Road Berrimah, NT 0828

[48] Within QLD
[49] Interstate

AGENCY	WEBSITE/EMAIL	PHONE	ADDRESS
South Australia			
Primary Industries and Regions SA	pir.sa.gov.au	(08) 8207 7820	GPO Box 1671 Adelaide, SA 5001
Biosecurity SA-Plant Health	pir.sa.gov.au/biosecuritysa/planthealth PIRSA.planthealth@sa.gov.au	(08) 8207 7820	33 Flemington Street Glenside, SA 5065
Biosecurity SA-Plant Health Market access and Interstate Certification Assurance	IRSA.planthealthmarketaccess@sa.gov.au	(08) 8207 7814	
Biosecurity SA-Plant Health Transport manifest lodgement	pirsa.planthealthmanifest@sa.gov.au	Fax: (08) 8124 1467	
South Australian Research and Development Institute	sardi.sa.gov.au sardi@sa.gov.au	(08) 8303 9400	2b Hartley Grove Urrbrae, SA 5064
Tasmania			
Department of Primary Industries, Parks, Water and Environment	dpipwe.tas.gov.au BPI.Enquiries@dpipwe.tas.gov.au	1300 368 550	GPO Box 44, Hobart, TAS 7001
Victoria			
Department of Economic Development, Jobs, Transport and Resources	economicdevelopment.vic.gov.au/	136 186	CPHO Group, Division of Market Access and Regulation, Biosecurity Branch Department of Economic Development, Jobs, Transport and Resources 475 Mickleham Road, Attwood, Victoria 3047

AGENCY	WEBSITE/EMAIL	PHONE	ADDRESS
Western Australia			
Department of Primary Industries and Regional Development	agric.wa.gov.au/	(08) 9368 3333	WA DPIRD PO Box 1143 West Perth WA 6872

Farm biosecurity

Introduction

Plant pests can have a major impact on production if not managed effectively. This includes pests already present in Australia and a number of serious pests of tea tree that Australia does not have.

Farm biosecurity measures can be used to minimise the spread of such pests before their presence is known or after they are identified, and therefore can greatly increase the likelihood that they could be eradicated. This section of the document outlines farm biosecurity and hygiene measures to help reduce the impact of pests on the industry.

The biosecurity and hygiene measures outlined here can be considered as options for each farm's risk management. Many of these measures can be adopted in a way that suits a given farm so that each can have an appropriate level of biosecurity.

Farm biosecurity reporting procedures and hygiene strategies to reduce threats covered in this document are:

- selection and preparation of appropriate planting material
- chemical control measures
- control of vectors
- control of alternative hosts
- neglected farms and volunteer plants
- post-harvest handling and produce transport procedures
- use of warning and information signs
- managing the movement of vehicles and farm equipment
- managing the movement of people
- visiting overseas farms/orchards – what to watch out for when you return
- including farm biosecurity in industry best management practice and quality assurance schemes
- farm biosecurity checklist.

Development of a farm biosecurity plan tailored to the needs of an individual operation is a good way to integrate best practice biosecurity with day to day operations (farmbiosecurity.com.au/planner/). Further information on farm biosecurity can be found at farmbiosecurity.com.au or by contacting the Australian Tea Tree Industry Association (ATTIA Ltd).

Reporting suspect emergency plant pests

Rapid reporting of exotic plant pests is critical as early detection gives Australia the best chance to effectively control and eradicate pests. If you find something you believe could be an exotic plant pest, call the Exotic Plant Pest Hotline immediately to report it to your local state or territory government.

The one phone number – **1800 084 881** – will connect to an automated system that allows the caller to choose the state or territory to which the report relates. The caller will then be connected to the relevant authority for that jurisdiction. Most lines are only monitored during business hours. Messages can be left outside of those hours and calls will be returned as soon as an officer is available. A summary of the opening hours for each state and territory is provided in Table 14. Each jurisdiction also has an alternative contact to ensure no report is missed. It does not matter which of these methods is used to report a suspect exotic plant pest. The important thing is to report it.

Calls to the Exotic Plant Pest Hotline will be answered by an experienced person, who will ask some questions to help understand the situation, such as:

- What was seen (describe the pest or send a photo)
- Where it was found
- What it was found on
- How many pests are present/how infected is the crop
- How widely distributed it is
- When it was first noticed

It is important not to touch or move the suspect material as this may spread the exotic pest or render samples unsuitable for diagnostic purposes. A biosecurity officer may attend the location to inspect and collect a sample. In some cases, the biosecurity officer will explain how to send a sample for testing. In this circumstance they will explain how to do this without risk of spreading the pest and ensuring it arrives at the laboratory in a suitable condition for identification.

Every report will be taken seriously, followed up and treated confidentially.

Table 14. Exotic Plant Pest Hotline hours of operation and alternate contact information for reporting per jurisdiction.

STATE/TERRITORY	HOTLINE HOURS	ALTERNATIVE CONTACT
NSW	Operates 08:30 – 16:30 Monday to Friday. After hours answering machine service with messages followed up the next business day.	biosecurity@dpi.nsw.gov.au
NT	Operates 08:00 – 16:30 Monday to Friday. After hours answering machine service with messages followed up the next business day.	quarantine.NT@nt.gov.au
QLD	Operates 08:00-17:00 Monday to Friday (09:00-17:00 Thursday). Calls outside these hours are answered by a third party who will take the message and depending on the urgency of the report, organise a response from a biosecurity officer as soon as possible.	Biosecurity Queensland 13 25 23
SA	Operates 24 hrs/ 7 days	Online plant pest report form
TAS	Operates 24 hrs/ 7 days	Biosecurity Tasmania (03) 6165 3777
VIC	Operates 08:00 – 18:00 Monday to Friday. After hours answering machine service with messages followed up the next business day. Option also to forward to the 24 hr Emergency Animal Disease Watch Hotline.	plant.protection@ecodev.vic.gov.au
WA	Operates 08:30 – 16:30 Monday to Friday. After hours answering machine service with messages followed up the next business day.	info@agric.wa.gov.au

Recent changes to legislation in some states includes timeframes for reporting and have implications for those who do not report. It is important that individuals know the obligations for their jurisdiction.

Some tea tree pests are notifiable under each state or territory's quarantine legislation. Each state or territory's list of notifiable pests are subject to change over time so contacting your local state/territory agricultural agency (Table 13) will ensure information is up to date. Landowners and consultants have a legal

obligation to notify the relevant state/territory agriculture agency of the presence of those pests within a defined timeframe (Table 15).

Preparedness

Pest-specific preparedness and response information documents

To help prepare for an incursion response a list of pest-specific preparedness and response information documents is provided in Table 5. Over time, as more resources are produced for individual pests of the tea tree industry they will be included in this document and made available through the PHA website. Resources include the development of pest-specific information and emergency response documents, such as fact sheets, contingency plans, diagnostic protocols and a summary of surveillance programs currently in operation for these High Priority Pests (see planthealthaustralia.com.au/pidd). These documents and programs should be developed over time for all medium to high risk pests listed in the TST (Appendix 2: threat summary tables).

Fact sheets

Fact sheets or information sheets are a key activity of biosecurity extension and education with growers. Fact sheets provide summary information about the pest, its biology, what it looks like and what symptoms it may cause. They also contain detailed images. Refer to Table 15 for a list of current fact sheets available for tea tree producers.

Contingency Plans

Contingency Plans provide background information on the pest biology and available control measures to assist with preparedness for incursions of a specific pest into Australia (Table 15). The contingency plan provides guidelines for steps to be undertaken and considered when developing a response plan for the eradication of that pest. Any response plan developed using information in whole or in part from a contingency plan must follow procedures as set out in PLANTPLAN and be endorsed by the National Management Group prior to implementation.

As a part of contingency planning, biological and chemical control options are considered, as are options for breeding for pest resistance. Through the planning process, it may be discovered that there are gaps in knowledge. Such gaps should be identified and consequently be considered as RD&E needs to be met within the implementation table (Table 3).

For a list of current contingency plans see planthealthaustralia.com.au/pidd.

National Diagnostic Protocols

Diagnostic protocols are documents that contain information about a specific plant pest, or related group of pests, relevant to its diagnosis. National Diagnostic Protocols (NDP) are diagnostic protocols for the unambiguous taxonomic identification of a pest in a manner consistent with ISPM No. 27 – Diagnostic Protocols for Regulated Pests. NDP include diagnostic procedures and data on the pest, its hosts, taxonomic information, detection and identification.

Australia has a coherent and effective system for the development of NDP for plant pests managed by the Subcommittee on Plant Health Diagnostics (SPHD). NDP are peer reviewed and verified before being endorsed by Plant Health Committee (PHC).

Endorsed NDP are available on the National Plant Biosecurity Diagnostic Network (NPBDN) website (plantbiosecuritydiagnostics.net.au), together with additional information regarding their development and endorsement.

Diagnostic information for some tea tree pests (Table 15) is available through the PHA website planthealthaustralia.com.au/pidd. For diagnostic information on fruit flies, refer to the Australian Handbook for the Identification of Fruit Flies, available from the PHA website.

*Table 15. Pest-specific information and documents for the tea tree industry, complied from the tea tree industry TST. *Indicates a HPP for the tea tree industry*[50]

SCIENTIFIC NAME	COMMON NAME	FACT SHEET	CONTINGENCY PLAN	DIAGNOSTIC PROTOCOL
Invertebrates				
Hemiptera (stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)				
Homalodisca vitripennis	Glassy winged sharpshooter	Yes- Almond, blueberry, citrus, Nursery and Garden and Viticulture industries.	Yes- Nursery and Garden	NDP-23
Pathogens				
Oomycetes				
**Phytophthora ramorum*	Sudden oak death	Yes- N&G and Plantation forestry	Yes- N&G	NDP 5

Research Development and Extension

Research, Development and Extension – Linking Biosecurity Outcomes to Priorities

Through the biosecurity planning process, gaps in knowledge or extension of knowledge have been identified and documented in the Implementation Table. Some of these gaps will require:

- further research and development (e.g. understanding risk pathways, developing surveillance programs or diagnostic protocols, developing tools to facilitate preparedness and response, developing IPM or resistance breeding strategies)
- other gaps will require communication or extension of that knowledge to various target audiences (i.e. developing awareness raising materials, undertaking training exercises, running workshops, consideration of broader target audiences).

It is important that the RD&E gaps identified through this plan feed directly into the normal annual RD&E priority setting and strategic planning activities that an industry undertakes. This is fundamental if an industry is to progress biosecurity preparedness and response throughout the life of the biosecurity plan.

Market access

As an active trading nation, Australia has entered into a number of multilateral and bilateral trade agreements that influence its plant biosecurity system. On a multilateral level, Australia's rights and obligations in relation to plant biosecurity are set out under World Trade Organization (WTO) agreements, particularly the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), although others may apply in certain circumstances.

The SPS Agreement provides WTO member countries with the right to use sanitary and phytosanitary measures to protect human, animal and plant life or health. Under this agreement, countries are allowed to specify consistent, science-based conditions aimed at providing sanitary and phytosanitary protection but not unnecessarily restricting trade. The establishment of exotic pests in Australia may result in conditions on Australian exports that previously did not apply and in some cases, may result in the short or long-term loss of overseas markets, depending on the significance of the pest to the trading partner and the availability of

[50] Copies of these documents are available from planthealthaustralia.com.au/pidd or by contacting the relevant state/territory agriculture agency.

options to reduce the risk to acceptable levels. These options could include measures such as designation of pest free areas or places of production or application of treatments e.g. cold or fumigation. The time taken to regain access will depend on the availability and acceptance of measures to reduce risk and the appetite for risk of the receiving market.

References

Department of Agriculture, Fisheries and Forestry (2011) Import Risk Analysis Handbook 2011. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.

RESPONSE MANAGEMENT

Introduction

No matter how many preparedness activities are undertaken or how much surveillance is done at the border, a small number of plant pests will inevitably make their way into Australia. This section outlines the national agreements and processes in place to effectively respond to such incursions.

Gathering information, developing procedures, and defining roles and responsibilities during an emergency can be extremely difficult. To address this area, PHA coordinated the development of PLANTPLAN, a national set of incursion response guidelines for the plant sector, detailing the procedures required and the roles and responsibilities of all Emergency Plant Pest Response Deed (EPPRD) signatories affected by an Emergency Plant Pest (EPP).

The following section includes key contact details and communication procedures that should be used in the event of an incursion relevant to the Australian tea tree industry. Additionally, a listing of pest-specific emergency response and information documents are provided that may support a response. Over time, as more of these documents are produced for pests of the tea tree industry they will be included in the list and made available through the PHA website.

The Emergency Plant Pest Response Deed

A fundamental component of the Australian plant biosecurity system is the EPPRD, which is an agreement between the Australian government, the state/territory governments, 37 plant industries (including the Australian Tea Tree Industry Association) and PHA (collectively known as the signatories), that allows the rapid and efficient response to EPPs. The EPPRD is a legally binding document that outlines the basic operating principles and guidelines for EPP eradication responses.

The EPPRD provides:

- A national response management structure that enables all governments and plant industry signatories affected by the EPP to contribute to the decisions made about the response
- An agreed structure for the sharing of costs to deliver eradication responses to EPPs detected in Australia. Costs are divided between signatories affected by the EPP in an equitable manner based on the relative potential impact of the EPP
- A mechanism to encourage reporting of EPP detections and the implementation of risk mitigation activities
- A mechanism to reimburse growers whose crops or property are directly damaged or destroyed as a result of implementing an EPP Response Plan
- Rapid responses to EPPs (excluding weeds)
- A framework for decisions to eradicate are based on appropriate criteria (e.g. eradication must be technically feasible and cost beneficial)
- An industry commitment to biosecurity and risk mitigation and a government commitment to best management practice
- Cost Sharing of eligible costs

- An Agreed Limit for Cost Sharing
- An effective industry/government decision-making process.

For further information on the EPPRD, including copies of the EPPRD, fact sheets or Frequently Asked Questions, visit planthealthaustralia.com.au/epprd and planthealthaustralia.com.au/epprd-qa.

PLANTPLAN

PLANTPLAN outlines the generic approach to response management under the EPPRD and introduces the key roles and positions held by industry and government during a response. The document is supported by a number of operating guidelines, job cards and standard operating procedures that provide further detail on specific topics. PLANTPLAN underpins the EPPRD and is endorsed by all EPPRD signatories.

The current version of PLANTPLAN and supporting documents are available on the PHA website (planthealthaustralia.com.au/biosecurity/incursion-management/plantplan/).

For more information about PLANTPLAN and the supporting document visit planthealthaustralia.com.au/biosecurity/incursion-management/plantplan/

Funding a response under the EPPRD

The following section outlines how eradication responses are nationally cost shared between affected industries and governments.

A copy of the EPPRD can be downloaded from the PHA website planthealthaustralia.com.au/epprd.

Cost sharing a response

Affected industries and governments invest in the eradication of EPPs and share the costs of an agreed response plan, this is referred to as 'cost sharing'. Not all activities in a response are eligible to be cost shared, with some activities considered as normal commitments for signatories.

The cost shared costs of a response are divided between affected industries and governments in an equitable manner directly related to the benefit obtained from eradicating the EPP. These relative benefits are represented by the category of the pest, with the overall view that 'the higher the benefit, the greater the investment'.

There are four categories for EPPs (Table 16). The category indicates how the funding will be split between government and industries; with the government funding the share of public benefit and industry funding the share of private benefit. It does not indicate the likelihood of eradication or the overall importance of the pest i.e. an EPP listed as Category 1 is not deemed to be any more or less important than an EPP listed as Category 4.

Table 16. Response funding allocation between Government and Industry for an EPP.

CATEGORISING OF EPP	GOVERNMENT FUNDING	INDUSTRY FUNDING
Category 1	100%	0%
Category 2	80%	20%
Category 3	50%	50%
Category 4	20%	80%

Pest categorisation

The list of categorised EPPs can be found in Schedule 13 of the EPPRD. In the event that a response plan is endorsed for an uncategorised EPP, cost sharing will commence using the default category (Category 3) and may be revised later.

Any signatory to the EPPRD can request for additional pests to be categorised and added to Schedule 13 of

the EPPRD. Contact EPPRD@phau.com.au for more information and guidance on this process.

Once a substantiated request has been received by PHA a group of independent scientific technical experts (known as the categorisation group) will be convened to assess all known information about the EPP to identify the public and private benefits. Full details can be found in *Clauses 7* and *9* of the EPPRD.

Tea tree EPPs categorised to date

EPPs relevant to the Australian tea tree industry that are categorised and listed within Schedule 13 of the EPPRD are listed in Table 17.

Table 17. Formal categories for pests of the Australian tea tree industry listed in Schedule 13 of the EPPRD (as at January 2019).

FORMAL CATEGORY	SCIENTIFIC NAME	COMMON NAME
1	*Phytophthora ramorum*	Sudden oak death
1	*Uredo rangelii*[51]	Myrtle rust

How to respond to a suspect EPP

Following the detection of a suspect EPP, the relevant state agency will be notified either directly or through the Exotic Plant Pest Hotline. Within 24 hours of the state agency having a reasonable suspicion that they are dealing with an EPP, the Chief Plant Health Manager (CPHM) of the state or territory will inform the Australian Chief Plant Protection Officer (ACPPO). All signatories affected by the EPP (both government and industry) are then notified immediately, and a Consultative Committee on Emergency Plant Pests (CCEPP) meeting is convened (this process is outlined in Figure 4). Only the industry signatories affected by the EPP are engaged in the response process. These are determined based on the known hosts of the EPP. All positive detections of EPPs or suspect EPPs must undergo secondary identification from an independent laboratory. Confirmation of the identification should not delay the reporting of the suspected EPP to the ACPPO or the CCEPP.

[51] Synonym *Austropuccinia psidii*

Figure 4. Reporting of suspect EPPs and notification process.

Once a pest is notified to the CCEPP, all EPPRD signatories that are affected by the EPP play a part in the national response. This is primarily through the two national decision-making committees, both of which contain a representative from the Australian Tea Tree Industry Association. The committees are:

- The Consultative Committee on Emergency Plant Pests (CCEPP), which provide technical expertise on the response, and
- The National Management Group (NMG) which acts on recommendations from the CCEPP and make the final decisions about EPP responses and funding.

If the EPP is deemed ineradicable, a decision is made on another course of action, namely containment or long-term management. In 2016, a Transition to Management (T2M) phase was incorporated into the EPPRD following approval by all EPPRD Parties. T2M may only be initiated if a response plan has been approved and started and it has been agreed that eradication is not possible. Its aim is to provide a formalised structure for transitioning a response under the EPPRD from the eradication of an EPP under an approved Response Plan to management of the EPP outside of the EPPRD processes. T2M is not an automatic process as the parties to the response have to agree it is needed and what activities will be included. Its aims to provide a mechanism to enable the affected industry to transition to ongoing management of the pest.

The relevant state/territory agriculture department is responsible for the on-ground response to EPPs and will adopt precautionary emergency containment measures if appropriate. Depending on the nature of the EPP, measures could include:

- restriction of operations in the area
- disinfection and withdrawal of people, vehicles and machinery from the area
- restricted access to the area
- control or containment measures.

Each response to an EPP is applied differently due to the nature of the incursion, however, each follows the defined phases of a response as outlined at planthealthaustralia.com.au/biosecurity/incursion-management/phases-of-an-emergency-plant-pest-response/.

Owner reimbursement costs

Owner Reimbursement Costs (ORCs) are included in the shared costs of a response and are available to eligible growers to alleviate the financial impacts of crops or property that are directed to be destroyed under an agreed response plan.

ORCs were developed to encourage early reporting and increase the chance of successful eradication. ORCs are paid to the owner and cover direct costs associated with implementing a response plan, including:

- Value of crops destroyed,
- Replacement of lost capital items and
- Fallow periods

ORCs are only available when there is an approved response plan under the EPPRD, and only to industries that are signatories to the EPPRD, such as the tea tree industry.

The value of ORCs is directed by the ORC Evidence Frameworks and is based on an agreed valuation approach developed for each industry.

Further information about ORCs is available from planthealthaustralia.com.au/biosecurity/incursion-management/owner-reimbursement-costs/.

Industry specific response procedures

Industry communication

ATTIA Ltd are the peak industry body for the Australian tea tree industry[52], i.e. signatory to the EPPRD, and will be the key industry contact point if a plant pest affecting the tea tree industry is detected and responded to using the arrangements in the EPPRD. the Australian Tea Tree Industry Association will have responsibility for relevant industry communication and media relations (see PLANTPLAN for information on approved communications during an incursion). The contacts nominated for the CCEPP and the NMG by the Australian Tea Tree Industry Association will be contacted (Table 18) regarding any meetings of the CCEPP or NMG. It is important that all Parties to the EPPRD ensure their contacts for these committees are nominated to PHA and updated swiftly when personnel change.

Close cooperation is required between relevant government and industry bodies to ensure the effective development and implementation of a response to an emergency plant pest, and the management of media/communication and trade issues. Readers should refer to PLANTPLAN or undertake the relevant BOLT courses for further information.

Table 18. Contact details for ATTIA.

Website	**teatree.org.au/**
Postal address	PO Box 903, Casino NSW 2470
Email	ceo@attia.org.au
Phone	(02) 4017 1336
Fax	(07) 5604 1629

References

PLANTPLAN (2018) PLANTPLAN Australian Emergency Plant Pest Response Plan. Version 3.2. (planthealthaustralia.com.au/plantplan).

[52] For further information on ATTIA Ltd refer to schedule 7 of the EPPRD available at **http://www.planthealthaustralia.com.au/biosecurity/emergency-plant-pest-response-deed/**

APPENDIX 1: PROFILE OF THE AUSTRALIAN TEA TREE INDUSTRY

To develop any biosecurity plan it is critical to understand the profile and context of the industry.

Australian Tea Tree Industry Association

The Australian Tea Tree Industry Association (ATTIA) is the peak body for the Australian tea tree industry. ATTIA works to represent, provide information to and advocate for the producers, manufacturers and exporters of Australian tea tree oil. To maintain the Australian advantage, quality control of the Australian product and its brand is critical. The ATTIA plays a crucial role in the setting of standards and in 2005 the ATTIA developed a Code of Practice to ensure a common standard of quality amongst the industry (ATTIA 2016).

In 2017 a statutory levy of 25c/kg of production was introduced to fund research, development and extension for the industry (AgriFutures Australia 2018b). In 2017 the tea tree industry also became a signatory to the Emergency Plant Pest Response Deed, coordinated by Plant Health Australia. As at July 2017, the biosecurity levy is set at 0 to be activated in the event of an emergency response to an emergency plant pest.

Industry profile

Tea tree is an Australian native species in the Myrtaceae family in the genus *Melaleuca*. Tea tree is a tall bushy shrub reaching up to 14 metres in height, with papery white bark and bushy flowers (AgriFutures 2018, Brophy et al. 2013). There are a number of different species of *Melaleuca* that produce essential oils which have antimicrobial properties including *M. alternifolia*, *M. argentea*, *M. cajuputi* and *M. leucadendra* (Brophy 2013). These species have been used medicinally by Aboriginal communities for thousands of years to treat a range of maladies (Brophy 2013). Narrow leaf tea tree, *Melaleuca alternifolia* is the variety now grown by the Australian industry to produce the tea tree oil product. *M. alternifolia* thrives in warm humid conditions, in low-lying swampy areas and along creeks and streams (Wilson 1991). Due to the water requirements of the trees, Australian tea tree plantations have been established in high rainfall areas receiving greater than 1000mm/year (Salvin et al. 2004). Correspondingly, the native range of *M. alternifolia* includes southern Queensland, coastal areas of central and northern NSW and the adjoining tablelands (Carson et al. 2006).

Tea trees are cultivated for their oil which has antimicrobial, antifungal, antiviral and anti-inflammatory properties and is used in many medicinal, veterinary, aromatherapy and cosmetic products (Baker et al. 2010). The oil (terpinen-4-ol type) is distilled from the leaves and chopped stems of the plant via steam injection. Leaf oil concentration ranges from 1-3% fresh weight (Brophy et al. 2013).

Tea tree oil has been distilled commercially from *Melaleuca alternifolia* since the 1920's. However, demand for tea tree oil rose significantly in the 1990's, initiating the establishment of the first commercial plantations. Up until that point, demand for tea tree had been met through wild harvesting.

The first plantations were established from wild seed, and as a consequence, the oil quality and yield were highly variable. To address this inefficiency, ATTIA and RIRDC (now AgriFutures Australia) came together to support a long-term breeding project, beginning in 1993 (Baker et al. 2010). This breeding programme was successful in increasing oil yield from 100–150 kg/ha to yields of 350–450 kg/ha in current superior lines (Baker et al. 2010).

The Australian tea tree industry has become an important industry, producing 900 000kg of pure tea tree oil in 2017 with a farm gate value of $35 million and a total value of $75 million to the Australian economy (AgriFutures Australia 2018a), increasing by 25% each year since 2013.

There are currently around 140 tea tree growers farming 4200 hectares of tea tree plantations in Australia. These are predominantly situated in the Northern Rivers, Central and North Coast of NSW, and the Atherton Tablelands and Dimbulah Districts of QLD (AgriFutures Australia 2018a).

The industry has a diverse grower profile with plantations ranging from 5-700 hectares and from part-time businesses to large operations employing numerous staff.

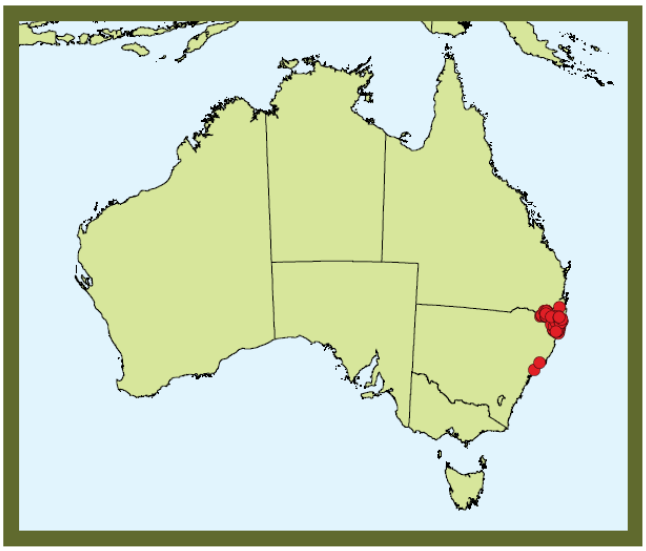

Figure 5. Productions areas for Australian tea tree oil, M. alternifolia *(Brophy et al. 2013).*

Tea tree is grown as a perennial row crop which is mechanically harvested with adapted forage harvesters or cotton pickers. Harvest timing is not defined by growth habit, though plantations are generally harvested annually (Salvin et al. 2004).

Australian production accounts for about 80% of global supply, with the remaining product coming from China, South Africa, Zimbabwe and Kenya (AgriFutures Australia 2018b). About 90% of production is exported, primarily as bulk oil. North America is the largest export market for Australian tea tree oil with 54% of export product being sent there, followed by Europe (30%) and Asia (14%) (AgriFutures Australia 2018a). The domestic demand is estimated to be about 95 000 kg annually, though much of this is further processed and sent to the export market as value added products such as shampoos, soap and burn dressings.

ATTIA and AgriFutures Australia continue to work together to develop a competitive and prosperous industry. Issues with increased competition from China, adulteration and vastly fluctuating prices have triggered the industry to focus on increasing efficiency through genetic improvement, especially in regard to oil content, to remain viable (AgriFutures Australia 2018b). To this end, the industry is concentrating on establishing seed production nurseries for the further advancement of genetic gain. Other objectives include identifying innovative uses for tea tree oil, increasing demand and improving extension, sustainability and human capital (AgriFutures Australia 2018b).

References

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Salvin S, Bourke M and Byrne T (2004) The new crop industries handbook. Rural Industries Research and Development Corporation. Publication no. 04/125. (Accessed 21.02.2019)

Wilson PG (1991) *Melaleuca alternifolia* (Maiden & Betche) Cheel, New South Wales Flora Online plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name =Melaleuca~alternifolia (Accessed 9.1.2019)

APPENDIX 2: THREAT SUMMARY TABLES

Tea tree industry threat summary tables

The information provided in the threat summary tables is an overview of exotic plant pest threats to the tea tree industry. Almost 50 exotic plant pests were identified. Summarised information on entry, establishment and spread potentials and economic consequences of establishment are provided where available. Pests under official control[53] or eradication may be included in these tables where appropriate. However, tea tree pests that are established but regionalised within Australia are not covered by TST but may be assessed in state biosecurity plans. Assessments may change given more detailed research and will be reviewed with the biosecurity plan.

Full descriptions of the risk rating terms can be found on page 39. An explanation of the method used for calculating the overall risk can be found on the PHA website[54]. Additional information on a number of the pests listed in the TST can be found in pest-specific information document (Table 5).

[53] Official control defined in ISPM No. 5 as the active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests or for the management of regulated non-quarantine pests

[54] Available from planthealthaustralia.com.au/biosecurity/risk-mitigation

Invertebrates

Table 19. Tea tree invertebrate threat summary table. This table includes pests of leviable tea tree species (Melaleuca alternifolia).

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Diptera (flies and midges)										
Metaleurodicus cardini	Cardin's whitefly	*Psidium guajava, Citharexylum fruiticosum, Dipholis salicifolia, Duranta repens, Duranta sp., Eugenia sp., Malpighia glabra, Melaleuca spp., Paurotis wrightii, Plumeria sp., Citrus spp.* (including *C. sinensis), Pimenta dioica, Citharexylum spinosum.*	Above ground plant parts	Infested plant material. Adults are capable of flight	USA, Cuba, Bermuda, Jamaica	LOW	HIGH	HIGH	LOW[55]	**VERY LOW**
Coleoptera (beetles and weevils)										
Heterobostrychus hamatipennis	Chinese auger beetle	*Acacia, Anogeissus, Bombax, Boswellia, Canarium, Dalbergia, Dendrocalamus, Eugenia, Garuga, Machilus, Mangifera, Mallotus, Quercus, Shorea, Terminalia, Vatica, Melaleuca*	Stems[56]	Infested plant material. Adults are capable of flight	USA, Bhutan, China, India, Indonesia, Japan, Laos, Madagascar, Philippines, Taiwan, Belgium	HIGH	MEDIUM	MEDIUM	LOW	**VERY LOW**

[55] Only causes significant damage when the parasite/predator complex has been disrupted.
[56] Beetle species affecting dried timber (https://pflanzengesundheit.julius-kuehn.de/dokumente/upload/5abfe_heterobostrychus-hamatipennis_express-pra.pdf)

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
***Xylosandrus compactus* (without wood rotting fungi including *Fusarium solani*)**[57]	Black twig borer, shot hole borer	Very broad host range (200 species from 60 different families) including soursop, tea, coffee, *Acacia* spp., cinnamon, mango, macadamia, avocado, pine, olive, mahogany, *Melaleuca* spp..[58]	Stems	Infested plant material. Adults are capable of flight	Cambodia, China, East Timor, India, Indonesia, Laos, Japan, Malaysia, Myanmar, Sri Lanka, Philippines, Taiwan, Singapore, Thailand, Vietnam, Benin, Cameroon, Central African Republic, Comoros, Congo, Democratic Republic of Congo, Côte d'Ivoire, Gabon, Equatorial Guinea, Guinea, Ghana, Guinea-Bissau, Kenya, Liberia, Madagascar, Nigeria, Mauritania, Mauritius, Réunion, Senegal, Seychelles, Sierra Leone, Sth Africa, Tanzania, Togo, Uganda, Zimbabwe, USA, Cuba, British Virgin Is., Curaçao, Puerto Rico, Netherlands Antilles, US Virgin Is., Brazil, Peru, Italy, Fiji, American Samoa, Papua New Guinea, Samoa, Solomon Is.	HIGH	MEDIUM	HIGH	LOW	**LOW**

[57] Vector of various wood rotting fungi (including *Fusarium solani*) which females cultivate to raise young.
[58] *Melaleuca leucadendron* is susceptible to black twig borer (Nelson and Davis).

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
***Xylosandrus compactus* (with wood rotting fungi including *Fusarium solani*)**[59]	Black twig borer, shot hole borer	Very broad host range (200 species from 60 different families) including soursop, tea, coffee, *Acacia* spp., cinnamon, mango, macadamia, avocado, pine, olive, mahogany, *Melaleuca* spp.[60]	Stems	Infested plant material. Adults are capable of flight	Cambodia, China, East Timor, India, Indonesia, Laos, Japan, Malaysia, Myanmar, Sri Lanka, Philippines, Taiwan, Singapore, Thailand, Vietnam, Benin, Cameroon, Central African Republic, Comoros, Congo, Democratic Republic of Congo, Côte d'Ivoire, Gabon, Equatorial Guinea, Guinea, Ghana, Guinea-Bissau, Kenya, Liberia, Madagascar, Nigeria, Mauritania, Mauritius, Réunion, Senegal, Seychelles, Sierra Leone, Sth Africa, Tanzania, Togo, Uganda, Zimbabwe, USA, Cuba, British Virgin Is., Curaçao, Puerto Rico, Netherlands Antilles, US Virgin Is., Brazil, Peru, Italy, Fiji, American Samoa, Papua New Guinea, Samoa, Solomon Is.	HIGH	MEDIUM	HIGH	HIGH	**HIGH**

[59] Vector of various wood rotting fungi (including *Fusarium solani*) which females cultivate to raise young.
[60] *Melaleuca leucadendron* is susceptible to black twig borer (Nelson and Davis).

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Hemiptera (stink bugs, aphids, mealybugs, scale, whiteflies and hoppers)										
Alecanochiton marquesi	Scale	*Pouteria caimito*, Arabica coffee, *Gonzalagunia spicata*, *Ixora* spp., *Chrysophyllum caimito*, *Gossypium* spp., *Jasminum* spp., *Melaleuca* spp., *Lacuma caimito*	Above ground plant parts	Transmitted through infested plant material and machinery.	Brazil, French Guiana	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Aspidiotus ruandensis	Scale	*Euphorbia spp., Cassia spp., Melaleuca spp.*	Above ground plant parts	Transmitted through infested plant material and machinery.	Cameroon, Guinea, Rwanda	LOW	LOW	LOW	LOW	**NEGLIGIBLE**
***Homalodisca vitripennis* (without *Xylella fastidiosa*)[61]**	Glassy winged sharpshooter	Very broad host range including blackberry, okra, grapevine, citrus, plum, almond, peach, macadamia, apricot, cherry, *Melaleuca* spp., pistachio and ornamentals	Leaves, stems	Infested plant material. Adults are capable of flight	Mexico, USA, Chile, Cook Islands, French Polynesia	MEDIUM	HIGH	HIGH	LOW[62]	**LOW**

[61] Glassy winged sharpshooter is a vector of the bacterial plant pathogen *Xylella fastidiosa*

[62] Glassy winged sharpshooter is a vector of the bacterial plant pathogen *Xylella fastidiosa*. This pathogen has a very broad host range and has a devastating impact on many crops such as olives, citrus and grapevine. It is not known if *X. fastidiosa* infects and causes symptoms on *Melaleuca alternifolia*. The economic rating of low is in the absence of *X. fastidiosa*. This rating may change in the presence of *X. fastidiosa* if it causes disease of tea tree.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Milviscutulus ciliatus	Scale	*Cerbera manghas, Connarus spp., Macaranga spp., Decaspermum spp., Eugenia spp., Melaleuca spp., Psidium guajava*	Above ground plant parts	Transmitted through infested plant material and machinery.	Fiji	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**
Paratachardina pseudolobata	Lobate lac scale	Very broad host range including *Melaleuca* spp., mango, *Annona* spp. *Acacia* spp., oak, magnolia, avocado, fig, jasmine, *Rosa* spp., macadamia, *Malus* spp., *Pyrus* spp., citrus, guava	Above ground plant parts	Transmitted through infested plant material and machinery.	Christmas Island, India, USA, Bahamas, Puerto Rico	MEDIUM	HIGH	HIGH	LOW	**LOW**
Rhizoecus americanus	American ground mealy bug	*Melaleuca spp.*, pineapple, *Aralia*, asparagus, chrysanthemum, *Dieffenbachia*, *Ficus*, gardenia, hibiscus, kentia, lantana, *Phoenix*, *Saintpaulia*, *Strelitzia*	Roots	Transmitted through infested plant material and machinery. Soilborne.	Réunion, Mexico, USA, Costa Rica, Cuba, Guadeloupe, Honduras, Jamaica, Martinique, Panama, Puerto Rico, Trinidad and Tobago, US Virgin Is, South America, Colombia, Ecuador, Suriname, Italy	VERY LOW	LOW	LOW	LOW	**NEGLIGIBLE**
Tessarobelus guerini	Scale	*Annona squamosa, Calophyllum, Melaleuca, Syzygium pseudomalaccense*	Above ground plant parts	Transmitted through infested plant material and machinery.	New Caledonia	MEDIUM	MEDIUM	MEDIUM	LOW	**VERY LOW**

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Hymenoptera (ants and wasps)										
Lepisiota frauenfeldi	Browsing ant	-	-[63]	Infested soil. Adults are capable of flight	Albania, Armenia, Azerbaijan, Balearic Islands, Bulgaria, Croatia, Georgia, Greece, Iran, Israel, Malta, Montenegro, Spain, Republic of Macedonia, Turkey, Afghanistan, India, Réunion[64]	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Solenopsis invicta	Red imported fire ant	-	-[65]	Infested soil. Adults are capable of flight	Malaysia, Singapore, Taiwan, Mexico, China, USA, Antigua & Barbuda, Anguilla, Bahamas, British Virgin Islands, Cayman Islands, Costa Rica, Panama, Montserrat, Puerto Rico, St Kitts and Nevis, St Maarten, Trinidad & Tobago, Turks & Caicos, US Virgin Islands, Argentina, Bolivia, Brazil, Paraguay, Peru, Uruguay[66]	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

[63] After harvest and distillation spent tea tree biomass is sold as mulch. Exotic ant species could impact on the trade of tea tree mulch.
[64] Browsing ants are currently under eradication in the Northern Territory.
[65] After harvest and distillation spent tea tree biomass is sold as mulch. Exotic ant species could impact on the trade of tea tree mulch.
[66] Red imported fire ants are currently under eradication in Queensland.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Wasmannia auropunctata	Electric ant	-	-[67]	Infested soil. Adults are capable of flight	Antigua & Barbuda, Argentina, Aruba, Barbados, Belize, Bermuda, Bolivia, Brazil, Cameroon, Canada, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, French Guiana, Gabon, Galapagos Is, Lesser Antilles, Grenada, Guadeloupe, Haiti, Guatemala, Hawaii, Honduras, Israel, Mexico, Netherlands Antilles, Panama, New Caledonia, Paraguay, Puerto Rico, Peru, St Lucia, Sierra Leone, Spain, Solomon Is, Vanuatu, Uruguay, USA, Venezuela [68]	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**
Lepidoptera (butterflies and moths)										
Chora repandens		*Melaleuca spp.*	Leaves	Infested plant material. Adults are capable of flight	Indonesia, Malaysia, Philippines	MEDIUM	UNKNOWN	UNKNOWN	VERY LOW[69]	**UNKNOWN**

[67] After harvest and distillation spent tea tree biomass is sold as mulch. Exotic ant species could impact on the trade of tea tree mulch.
[68] Electric ants are currently under eradication in Queensland.
[69] Uncommon species. Larvae chew leaves. Harvesting practices of removing all above ground plant parts every season is likely to control this pest.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Clethrogyna turbata		*Mangifera, brassicas, Cycas, Hopea, Shorea, Hevea, Pelargonium, Zea, Saccharum, Acacia, Arachis, Cassia, Centrosema, Morus, Cyamopsis, Delonix, Erythrina, Mimosa, Mucuna,* asparagus, *Peltophorum, Sesbania, Vigna, Lagerstroemia, Melaleuca, Nelumbo, Nicotiana, Tectona*	Leaves	Infested plant material. Adults are capable of flight	Malaysia, Indonesia, Myanmar, China (Hainan)	MEDIUM	MEDIUM	MEDIUM	VERY LOW[70]	**NEGLIGIBLE**
***Neostauropus spp.* (including *N. alternus and N. nephodes*)**	Lobster moth	Tea, coffee, rambutan, mango, *Melaleuca, Ricinus, Careya, Cajanus, Cassia, Ougeinia, Wagatea, Pithecellobium*	Leaves	Infested plant material. Adults are capable of flight	Brunei, Indonesia, Malaysia	MEDIUM	MEDIUM	LOW	LOW[71]	**NEGLIGIBLE**
Pelagodes aucta	Emerald moth	*Chrysanthemum, Mangifera, Rosa, Melaleuca, Xylia, Polyalthia, Trema, Schleichera*	Leaves	Infested plant material. Adults are capable of flight	Borneo, India	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[70] Little information on impact on *Melaleuca*.
[71] Little information on impact on Melaleuca. Biocontrols are available overseas.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Strepsicrates rhothia	Eucalyptus leaf roller	*Callistemon citrinus*, *Coriaria nepalensis*, *Eucalyptus* spp. (including *E. alba, E. grandis, E. saligna, E. camaldulensis, E. citriodora, E. deglupta, E. robusta, E. eremophylla, E. paniculata, E. propinqua, E. raveretiana, E. tereticornis, E. torelliana, E. urophylla*) *Eugenia* spp., *Lophostemon confertus*, mango, *Melaleuca*, *Psidium cattleianum*, *Psidium guajava*, *Syzygium cumini*, *Woodfordia fruticosa, Derris* spp.,	Leaves	Infested plant material. Adults are capable of flight	East Africa, Hong Kong, India, Kenya, Malawi, Malaysia, Mauritius, Papua New Guinea, Sri Lanka, West Malaysia	HIGH	HIGH	HIGH	VERY LOW	**VERY LOW**

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Thyridopteryx ephemeraeformis	Evergreen bagworm	*Melaleuca* spp., *Juniperus* spp., *Thuja* spp., live oak (*Quercus virginiana*), southern red cedar (*Juniperus silicicola*), willow (*Salix* spp.), maple (*Acer* spp.), elm (*Ulmus* spp.), pine (*Pinus* spp.), Indian hawthorn (*Raphiolepis indica*), Ligustrum (*Ligustrum japonica*), *Viburnum* spp., Adonidia palms (*Veitchia merrillii*)	Leaves	Infested plant material. Adults are capable of flight	West Indies, USA, West Malaysia	LOW	LOW	LOW	LOW[72]	**NEGLIGIBLE**
Trabala irrorata		*Eugenia aquea, Melaleuca spp., Melastoma, Psidium guajava, Shorea, Sonneratia caseolaris*	Leaves	Infested plant material. Adults are capable of flight	Myanmar, West Malaysia	LOW	LOW	LOW	UNKNOWN[73]	**UNKNOWN**
Zeuzera coffeae	Coffee borer, coffee carpenter	Polyphagous including *Eucalyptus* spp., *Melaleuca* spp., *Acacia* spp., tea, coffee, *Casuarina equisetifolia*, teak, sandalwood, citrus and cotton.	Stems	Infested plant material. Adults are capable of flight	Bangladesh, China, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam	HIGH	HIGH	HIGH	VERY LOW	**VERY LOW**

[72] Harvesting practices of the tea tree industry mean that this pest is unlikely to have a significant impact.
[73] Possibly in Thailand. No information on impact on *Melaleuca*.

Pathogens

Table 20. Tea tree pathogen threat summary table. This table includes pests of leviable tea tree species (Melaleuca alternifolia).

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Fungi										
Amethicium chrysocreas		Birch, mango, *Acacia spp., Melaleuca spp., Aleurites moluccana, Eucalyptus spp., Fraxinus uhdei, Grevillea robusta, Toona ciliata, Metrosideros polymorpha, Psidium* spp. (including *P. guajava, P. cattleianum*), *Sapindus saponaria,*	Roots	Infected plant material. Dispersed by airborne and soilborne spores and infected tools and machinery.	Hawaii, North America	LOW	MEDIUM	MEDIUM	UNKNOWN	**UNKNOWN**

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Armillaria tabescens	Clitocybe root rot	Very broad host range including *Prunus amygdalus*, *Aleurites*, citrus, *Vitis*, *Melaleuca*, oak, *Acacia*, *Casuarina* spp., hickory, lychee, *Eucalyptus spp.*,, pine, oleander, peach, almond, blueberry, common jujube, banana, guava coffee, macadamia, pear, apple, apricot, plum, Japanese plum	Roots	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	China, India, Japan, South Korea, Nepal, Malaysia, Turkey, Fiji Madagascar, Malawi, Mauritius, Tanzania, Zimbabwe, Mexico, USA, Panama, Trinidad & Tobago, Brazil, Albania, Italy, Czech Republic, UK, France, Germany, Greece, Montenegro, Netherlands, Serbia, Portugal, Slovakia, Slovenia, Spain[74]	LOW	MEDIUM	LOW	LOW[75]	**NEGLIGIBLE**
Asteridiella melaleucae	Sooty mould	*Melaleuca* spp.	Leaves	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	New Caledonia	LOW	MEDIUM	HIGH	LOW[76]	**VERY LOW**

[74] Wide spread overseas occurring in North America, South America, Europe, Asia and Africa.

[75] Similar impact to other *Armillaria* spp. in Australia. Established *Armillaria* spp. are not economically significant in tea tree plantations. Unlikely to be a problem on mulch from tea tree as it is heated for oil extraction prior to use.

[76] Typically form small shield shaped black ascostroma on leaves of various plants and are parasitic but rarely cause significant damage (Roger Shivas pers. comm.). The economic impact may change if prolific production of honeydew by insects.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
***Austropuccinia psidii* (exotic strains)** [77]	Myrtle rust	Myrtaceae	Leaves, shoots	Infected plant material. Dispersed by airborne spores, infected tools and machinery	China, India, Japan, Indonesia, Taiwan, South Africa, Mexico, USA, Cuba, Costa Rica, Dominica, Brazil, Dominican Republic, Jamaica, Guatemala, Panama, Puerto Rico, Trinidad & Tobago, Argentina, Colombia, Ecuador, Paraguay, Uruguay, Venezuela, New Caledonia, New Zealand	HIGH	HIGH	HIGH	HIGH	**HIGH**
Calonectria brassicae (syn. *C. gracile*)		Broad host range including carrot, coconut, pines, potato, soybean, peanut, peas, beans, macadamia, lucerne, *Pinus* spp., capsicum, *Melaleuca* spp., callistemon, rice,	Roots	Infected plant material. Dispersed by soilborne spores and infected tools and machinery[78]	Brazil, United States, China, Indonesia, New Caledonia, Mauritius, Taiwan, India, Sri Lanka, South Africa, Vietnam, Cameroon, Martinique, St Lucia, Colombia, Canada, Malaysia	HIGH	HIGH	HIGH	UNKNOWN	**UNKNOWN**

[77] The taxonomy of this species is poorly understood as is the pathogenicity of different strains.

[78] *Calonectria* spp. are known to be seedborne. More likely to be an issue in tea tree nurseries and new plantations than established plantations.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Calonectria ovata	Blight, leaf spot, cutting and root rot.	*Eucalyptus spp., Melaleuca spp.*	Leaves, stems	Infected plant material. Dispersed by airborne spores and infected tools and machinery[79]	Brazil	LOW	HIGH	HIGH	UNKNOWN	**UNKNOWN**
Calonectria pteridis	Leaf spot, stalk rot, root rot	Peanut, *Melaleuca* spp., *Calistemon* spp., coconut, *Eucalyptus* spp., *Pinus* spp., *Rhododendron* spp.	Leaves, stems	Infected plant material. Dispersed by airborne spores and infected tools and machinery[80]	Brazil, Singapore, Malaysia, India, South Africa, Spain, Netherlands, USA, New Zealand, Costa Rica, Cameroon, Martinique, West Indies, Venezuela	HIGH	HIGH	HIGH	UNKNOWN	**UNKNOWN**
Coniophora puteana	Wood rot	Broad host range including *Pinus spp., Abies spp., Castanea sativa, Eucalyptus spp., Acer spp., Larix spp., Melaleuca spp. Picea spp., Prunus spp., Quercus spp., Tsuga spp.*	Stem	Infected plant material. Dispersed by airborne and soilborne spores and infected tools and machinery.	USA, Portugal, Denmark Tanzania, Canada, Denmark, United Kingdom	LOW	LOW	LOW	LOW	**NEGLIGIBLE**

[79] *Calonectria* spp. are known to be seedborne. More likely to be an issue in tea tree nurseries and new plantations than established plantations.
[80] *Calonectria* spp. are known to be seedborne. More likely to be an issue in tea tree nurseries and new plantations than established plantations.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Fomes lignosus	Root rot	*Acacia* spp., pigeon pea, Camellia, coffee, coconut, camphor laurel, *Ficus* sp., mango, *Melaleuca* spp., pepper, cocoa, rubber	Roots[81]	Infected plant material. Dispersed by airborne and soilborne spores and infected tools and machinery.	Uganda, Congo, Nigeria, Ivory Coast, Equatorial Guinea, Ghana, Sierra Leone, Brazil, Costa Rica, Mexico, India, Sri Lanka, Thailand, Malaysia, China, Philippines,	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

[81] This species affects roots and collar of rubber plants and other species in this genus affect stems and trunks of woody hosts. It is not known if this species affects stems and trunks of tea tree.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Fuscoporia torulosa (syn. *Phellinus torulosus*)	White alveolar wood decay	Wide host range including *Acer, Arbutus, Calluna, Castanea, Celtis, Ceratonia, Cercis, Cistus, Citrus, Cornus, Cratageus, Cydonia, Eucalyptus, Erica, Euonymus, Fagus, Fraxinus, Grevillea, Juglans, Helianthemum, Laurus, Malus, Melaleuca, Morus, Myrtus, Olea, Ostrya, Parrotia, Phillyrea, Pistacia, Populus, Pittosporium, Prunus, Punica, Pryus, Quercus (including Q. ilex), Robinia, Rosa, Salix, Ulex, Spartium, Ulmus, Viburnum, Vitus*, more rarely, conifers such as *Cedrus*, *Cupressus*, *Larix*, *Picea* and *Pinus*.	Trunk	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	Italy	LOW	MEDIUM	MEDIUM	LOW	**VERY LOW**

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Grallomyces portoricensis	Leaf spot, stalk rot, root rot	Coconut, *Melaleuca* spp., fig, palms,	Leaves	Infected plant material. Dispersed by soilborne spores and infected tools and machinery	Sierra Leone, Guyana Dominican Republic, Puerto Rico, Philippines, Trinidad & Tobago, Guyana, Brazil, Virgin Iss, Vanuatu, Malaysia, Mexico, Papua New Guinea, West Indies, Uganda	MEDIUM	MEDIUM	HIGH	UNKNOWN[82]	**UNKNOWN**
Pestalotia melaleucae		*Melaleuca* spp.	Stems	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	Taiwan	MEDIUM	MEDIUM	MEDIUM	VERY LOW[83]	**NEGLIGIBLE**
Pestalotiopsis melaleucae		*Callistemon spp. Melaleuca spp.*	Stems, branches and leaves	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	China	MEDIUM	MEDIUM	MEDIUM	VERY LOW[84]	**NEGLIGIBLE**

[82] It is not known if this species is a primary pathogen of tea tree.
[83] *Pestalotia* spp. and *Pestalotiopsis* spp. established in Australia are not economically significant on tea tree. It is not known if this species is a synonym of *Pestalotiopsis melaleucae*.
[84] *Pestalotia* spp. and *Pestalotiopsis* spp. established in Australia are not economically significant on tea tree. It is not known if this species is a synonym of *Pestalotia melaleucae*.

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Pestalotiopsis zonata		*Areca triandra, Lithocarpus brevicaudatus, Mangifera indica, Melaleuca spp., Mussaenda pubescens, Podocarpus macrophyllus*	Stems	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	China	MEDIUM	MEDIUM	MEDIUM	VERY LOW	**NEGLIGIBLE**
Phaeosaccardinula diospyricola	Sooty mould	*Anodendron paniculatum, Diospyros sp., Dracaena cinnabari, Melaleuca spp.*	Leaves	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	Brazil, India, New Caledonia	LOW	MEDIUM	HIGH	UNKNOWN	**UNKNOWN**
Pleomassaria melaleucae		*Melaleuca spp.*	Stems	Infected plant material. Dispersed by airborne spores and infected tools and machinery.	New Caledonia	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**UNKNOWN**

SCIENTIFIC NAME	COMMON NAME	HOST(S)	AFFECTED PLANT PART	DISPERSAL	DISTRIBUTION	ENTRY POTENTIAL	EST. POTENTIAL	SPREAD POTENTIAL	ECONOMIC IMPACT	OVERALL RISK
Russula livescens		*Melaleuca spp., Pinus spp.*	Roots	Infected plant material. Dispersed by airborne and soilborne spores and infected tools and machinery.	Pakistan, Taiwan	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN[85]	**UNKNOWN**
Oomycetes										
Phytophthora ramorum	Sudden oak death	Broad host range including oak trees, *Arbutus* spp., *Lithocarpus* spp., fir, maple, Ericaceae family (including blueberry), *Eucalyptus gunnii*, beech, bay laurel, magnolia, yew, *Melaleuca* spp. [86]	Stems, branches and leaves	Infected plant material. Dispersed by airborne and soilborne spores and infected tools and machinery.	North America and Europe	HIGH	HIGH	HIGH	HIGH	**HIGH**

[85] It is not known if this species is a pathogen of tea tree or a mycorrhizal species.
[86] The known host range continues to expand with more research. *Melaleuca squamea* has been identified as a potentially highly susceptible host (Ireland et al., 2012).

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