



Australian Government

AHCARB704 Conduct an entomology research project

Release: 1

AHCARB704 Conduct an entomology research project

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Application

This unit of competency describes the skills and knowledge required to conduct an entomology research project.

This unit applies to individuals with broad and coherent theoretical and technical knowledge with depth in one or more disciplines or areas of practice and cognitive, technical and communication skills to demonstrate autonomy, well developed judgement and responsibility in undertaking complex self-directed work and learning to provide specialist advice and functions.

The role involves the self-directed application of specialised knowledge in arboriculture with substantial depth in areas of tree pathology and entomology.

No occupational licensing, legislative or certification requirements are known to apply to this unit at the time of publication.

Pre-requisite Unit

Nil.

Unit Sector

Arboriculture (ARB)

Elements and Performance Criteria

Element	Performance criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Research Insects	1.1 Describe and identify anatomical, morphological and taxonomical features of insect specimens 1.2 Examine and describe the behaviour, ecology and nutrition of insect interaction with trees 1.3 Research annualised population and generational behaviour of

Element	Performance criteria
	insects
2. Construct professional resource collections	2.1 Develop and document an insect collection 2.2 Construct database of tree pests and vectors 2.3 Compile host, climatic and geographic distribution data 2.4 Record and compile generational phenology
3. Research and assess tree-pest and vector interactions	3.1 Research and identify natural antagonists, predators and parasitoids of insects 3.2 Identify phytophagous and damaging insect-tree dynamics 3.3 Identify symbiotic/beneficial and insect-tree dynamics 3.4 Research physiology of tree resistance to insects 3.5 Research host-pathogen and pathogen-vector interactions 3.6 Evaluate conditions associated with the selection of host trees by subcortical feeding insects and the factors associated with successful attack 3.7 Research and assess insect transmission of disease 3.8 Evaluate multi-trophic interactions between host plant-pest-pathogen/parasitoids from a systems approach
4. Evaluate control systems	4.1 Determine economic costs of insects 4.2 Evaluate insects as environmental indicators 4.3 Determine insect biological hazards 4.4 Investigate direct and indirect impact and effects of chemical pesticides or biocontrol agents on target and non-target organisms 4.5 Research insect resistance to pesticides 4.6 Investigate fungi as biological control agents of tree pests 4.7 Evaluate biological control methods of Integrated Pest Management (IPM) 4.8 Research and evaluate plant health management options to offset the effects of insect damage
5. Present results	5.1 Collect, tabulate, and statistically analyse data for publications 5.2 Determine the relevance of the results to arboriculture 5.3 Compile and communicate research and test results in a research paper 5.4 Submit research paper to a professional technical peer-reviewed journal 5.5 Review feedback and amend where appropriate 5.6 Communicate key facts and conclusions to industry in an article published in a non-technical industry publication or via presentation to an industry training event

Foundation Skills

Foundation Skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Unit Mapping Information

Not in unit mapping for CfE, but is used in AHC80115 - no equivalent.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>

Assessment Requirements for AHCARB704 Conduct an entomology research project

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Performance Evidence

The candidate must be assessed on their ability to integrate and apply the performance requirements of this unit in a workplace setting. Performance must be demonstrated consistently over time and in a suitable range of contexts.

The candidate must provide evidence for and demonstrate:

- describing and identifying anatomical, morphological and taxonomical features of insect specimens
- examining and describe the behaviour, ecology and nutrition of insect interaction with trees
- researching annualised population and generational behaviour of insects
- constructing a database of tree pests and vectors
- developing and documenting an insect collection
- compiling host climatic and geographic distribution data
- researching and identifying natural antagonists, predators and parasitoids of insects
- identifying phytophagous and damaging insect-tree dynamics
- identifying symbiotic/beneficial and insect-tree dynamics
- researching physiology of tree resistance to insects
- researching host-pathogen and pathogen-vector interactions
- evaluating conditions associated with the selection of host trees by subcortical feeding insects and the factors associated with successful attack
- researching and assess insect transmission of disease
- evaluating multi-trophic interactions between host plant-pest-pathogen/parasitoids from a systems approach
- determining economic costs of insects
- evaluating insects as environmental indicators
- determining insect biological hazards
- investigating direct and indirect impact and effects of chemical pesticides or biocontrol agents on target and non-target organisms
- researching insect resistance to pesticides
- investigating fungi as biological control agents of tree pests

- evaluating biological control methods of integrated pest management (IPM)
- researching and evaluating plant health management options to offset the effects of insect damage
- collecting, tabulating, and statistically analysing data for publications
- determining the relevance of the results to arboriculture
- compiling and communicate research and test results in a research paper
- submitting research paper to a professional technical peer-reviewed journal
- reviewing feedback and amend where appropriate
- communicating key facts and conclusions to industry in an article published in a non-technical industry publication or via presentation to an industry training event.

Knowledge Evidence

The candidate must demonstrate knowledge of:

- anatomical, morphological and taxonomical features of insect specimens
- behaviour, ecology and nutrition of insect interaction with trees
- annualised population and generational behaviour of insects
- database construction of tree pests and vectors
- annualised population of insects
- generational behaviour of insects
- insect collections
- generational phenology
- host, climatic and geographic distribution data
- natural antagonists, predators and parasitoids of insects
- phytophagous and damaging insect-tree dynamics
- symbiotic/beneficial and insect-tree dynamics
- physiology of tree resistance to insects
- host-pathogen and pathogen-vector interactions
- conditions associated with the selection of host trees by subcortical feeding insects
- factors associated with successful attack
- insect transmission of disease
- multi-trophic interactions between host plant-pest-pathogen/parasitoids from a systems approach
- economic costs of insects
- insects as environmental indicators
- insect biological hazards
- direct and indirect impact and effects of chemical pesticides or biocontrol agents
- target and non-target organisms
- insect resistance to pesticides
- fungi as biological control agents of tree pests
- biological control methods of Integrated Pest Management (IPM)
- plant health management options to offset the effects of insect damage

- collection, tabulation, and statistical analysis of data for publications
- compilation and communication of research and test results in a research paper
- professional technical peer-reviewed journal
- methods of reviewing and amending feedback
- methods of communicating key facts and conclusions in articles and presentations
- publishing in non-technical industry publications.

Assessment Conditions

It is an industry requirement that competency in this unit requires the identification by anatomical, morphological and taxonomical features of insect specimens, compiled into a collection of a minimum of one hundred (100) specimens of arboricultural concern or benefit from at least four (4) orders of insects. The collection may be digital and/or physical, correctly labelled and containing information on:

- date of collection
- location of collection
- host where applicable
- insect genus, and
- species where possible.

It is an industry requirement that research projects and management strategies include two or more of the following inter-disciplinary programs, and must focus on a specified insect or closely related insect species:

- Conceive, design, and implement safe and efficacious control strategies
- Research and develop alternative management strategies
- Investigate the longevity, infectivity, and virulence
- Monitor and assess infestation levels of outbreaks
- Design and implement biocontrol strategies using predators, parasitoids, and entomopathogenic fungi
- Design and implement methods for monitoring and assessment of population dynamics and distribution of tree pest species
- Conduct and evaluate a comparative ecological field study investigating efficacy and compatibility
- Trial and research a management plan for a phytophagous insect
- Trial and research a breeding program for a beneficial insect
- Conduct research of three model systems to examine tritrophic effects of susceptibility
- Design, implement, investigate, evaluate and report on tritrophic interactions
- Investigate preference and survivability
- Design projects investigating the subsequent risk analysis and tests required
- Develop a tree pest survey strategy
- Research and report on geographical or climatic distribution
- Coordinate an international and domestic multidisciplinary collaborative research initiative

Assessment must be demonstrated consistently over time in a suitable range of contexts and have a productivity-based outcome. No single assessment event or report is sufficient to achieve competency in this unit.

Assessment may be conducted in a simulated or real work environment, however determination of competency requires the application of work practices under work conditions.

The mandatory equipment and materials used to gather evidence for assessment include:

- equipment:
 - computer
 - word processing software
 - internet connection
 - digital camera with macro
 - diagnostic tools including sounding hammer, trowel, probe, cordless drill
 - soil testing equipment
 - digital dissection microscope 10 -100x
 - compound microscope
 - microtome, staining and slide mounting equipment
 - slides and coverslips
 - temporary/permanent mountant
 - histochemical stains
- materials:
 - entomology research paper
 - insect collection/database of pests and vectors

Assessors must satisfy current standards for RTOs in the assessment of arboriculture units of competency.

Assessment must be conducted only by persons who have:

- entomology vocational competencies at least to the level being assessed
- current entomology skills directly relevant to the unit of competency being assessed

Links

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