



# Biological control of galling insect pests of eucalypt plantations in the Mekong Region

## Overview

The Greater Mekong region has lost 30 per cent of its forests to agriculture, fuelwood collection and mining. Eucalypt trees, grown in short rotation plantations are being seriously damaged by a gall wasp pest.

Governments are now working to stem this forest loss, including large-scale reforestation projects and plantation expansion. Eucalypts are among the four most important forest plantation species in the Mekong region; however, invasive Australian insect pests are threatening the viability of these plantations.

The gall wasp, *Leptocybe invasa*, has rapidly become the most serious eucalypt pest. First detected in the Middle East and the Mediterranean regions in 2000, the wasp has spread to more than 30 countries in 10 years. It has caused serious damage to nurseries and young plantations in Vietnam since 2002, Thailand since 2003 and Cambodia and Lao PDR since 2007.

There is a limited ability for tree growers to control pests via conventional pest control, such as the use of pesticides (costly, ineffective in the field and not sustainable) or deployment of resistant germplasm (costly and subject to the introduction of new pests and pathogens with different resistance mechanisms). Only classical biological control, as part of an effective integrated pest management strategy, offers a relatively low-cost and proven option to manage such pests, while promoting sustainable forest management.



## KEY FACTS

**ACIAR Project No.** FST/2012/091

**Duration:** February 2014 to December 2019 (6 years)

**Target areas:** Cambodia, Lao PDR, Thailand and Vietnam

**Budget:** AU\$1,314,876

### Project Leader

Dr Simon Lawson

The University of the Sunshine Coast

### Key partners

- Department of Agriculture and Fisheries
- National Agriculture and Forestry Research Institute
- Birla Lao Pulp and Plantation Company Limited
- Stora Enso
- Sun Paper Holdings Lao Company Limited
- Oji Lao Plantation Forest Company Limited
- Burapha Agroforestry Company Limited
- Vietnamese Academy of Forest Sciences
- Royal Forest Department
- Kasetsart University, Thailand

### ACIAR Research Program Manager

Dr Nora Devoe

## Research/Objective

**The project aimed to develop effective biocontrol mechanisms for *L. invasa* and other eucalypt pests in the Mekong region to achieve better economic, social and environmental outcomes for poorer rural communities. The project will build on existing international knowledge and experience to apply classical biological control for effective, sustainable long-term control.**

**The specific research objectives were to:**

- Improve knowledge of the distribution of *L. invasa* and other pests of eucalypts in the region and evaluate the current impact on plantation productivity.
- Enhance knowledge on the distribution and role of *L. invasa* gall associates, particularly native and introduced parasitoids, in the Mekong region and improve their availability for biocontrol.
- Develop and trial a classical biological control program for *L. invasa* in the Mekong region, incorporating parasitoids previously released elsewhere, and identifying potential new candidate agents.
- Determine the Australian origins and distribution of *Leptocybe* spp. and their gall associates to identify new potential biological control agents, and document biological and genetic differences between introduced and native populations.

## Expected scientific results

- Increased understanding of the establishment, spread and impact of newly introduced biocontrol agents through patchy environments and under differing silvicultural regimes, as exemplified by exotic eucalypt plantations in subtropical and tropical environments.
- Investigation of the biological and evolutionary traits that have contributed to the invasive success of *L. invasa* to more accurately predict, model and prioritise biosecurity risks of exotic organisms being introduced to, and spreading from, Australia.
- If native *L. invasa* parasitoids found in the Mekong region, investigations on the effectiveness of these insects, which have adapted to a new host, and on their interactions with natural enemies that have co-evolved with the insect in Australia.

- Outcomes from this research will be applied more widely in the theoretical underpinnings of biological control and for future biocontrol programs for other Australian invasive eucalypt pests.
- Development of protocols for managing pests in eucalypt plantations developed for use by operational staff and local communities (in English and regional languages) to improve establishment outcomes and enhance the spread of any introduced biocontrol agents.

## Project outcomes

- The distribution of *Leptocybe* gall wasp and existing parasitoids has been mapped in each of the Mekong partner countries. The presence of two species of *Leptocybe* in the region has been confirmed.
- The project has identified that an Australian-origin parasitoid, *Quadrastichus mendeli*, is widespread in the region and providing variable levels of gall wasp control.
- Networking between our partner countries has been enhanced significantly, as has awareness of the importance of forest health to overall plantation productivity.
- Capacity in the region in forest health surveillance, research, basic diagnostics and forest pest collection curation to assist in managing current and future problems has been significantly enhanced.
- Information disseminated through regional workshops, field days, website, progress reports, scientific journal papers and presentations at national and international conferences. All molecular data deposited in databases accessible to the public.

