Cooperative Research Centre
for National Plant Biosecurity

Final Report

CRC60047

A National Postgraduate Curriculum for Plant Biosecurity

Author

A/Prof Anthony R Clarke

30 June 2010

Project Leader contact details:

Name: A/Prof Anthony R Clarke
Address: Discipline of Biogeosciences, Faculty of Science & Technology,
Queensland University of Technology, GPO Box 2434, Brisbane, Queensland 4001
Phone: 07 3138 5023
Fax: 07 3138 1535
Email: a.clarke@qut.edu.au

CRCNPB contact details:

Cooperative Research Centre for National Plant Biosecurity
LPO Box 5012
Bruce ACT 5012

Phone: +61 (0)2 6201 2882
Fax: +61 (0)2 6201 5067
Email: info@crcplantbiosecurity.com.au
Web: www.crcplantbiosecurity.com.au

Table of contents

1. Executive Summary

This document constitutes the final report for the CRCNPB project 60047 - *A National Postgraduate Curriculum in Plant Biosecurity*

The project "*A National Postgraduate Curriculum in Plant Biosecurity*" began activities in January 2007. Originally due to finish at the end of 2009, a delay in the final stages took the end date of the project through to mid-2010.

The original project summary read: "The traditional research disciplines underpinning plant biosecurity are the plant protection fields of entomology and plant pathology. However, biosecurity is more than just pathology and entomology and encompasses, in addition to these fields, issues such as mathematical risk analysis, social aspects of risk, emergency response planning, invasion biology and quarantine processes. These are not taught, in a unified degree structure, by any institution in Australia. Lack of appropriately trained personnel in plant biosecurity hinders Australia's ability to respond in an appropriate and timely fashion to biosecurity issues and this impacts detrimentally on all facets of our agricultural sector. This proposal will develop a national postgraduate curriculum in plant biosecurity which will address this problem. We are focusing on the linked, professional degrees of Postgraduate Certificate, Postgraduate Diploma and coursework Masters as a way of allowing entry into the field by people with no first degree but relevant professional experience (Postgrad Cert), or with a first degree in a relevant field (Posgrad Dip and Masters). Such an approach allows the greatest opportunity for practitioners seeking professional qualification and advancement."

At the conclusion of the project, we have achieved all major aims. In summary, the three named degrees are being offered by a consortium of five universities: Charles Darwin University, La Trobe University; Murdoch University, Queensland University of Technology and the University of Adelaide. The degrees are being flexibly delivered and Australia now has capacity to formally educate students in the nationally important area of plant biosecurity. The initial cohort of ten students, all professionals from relevant Commonwealth and State Departments, have responded very positively to the units so far taken, finding them rewarding to do and highly relevant to their needs.

2. Aims and objectives

The main aim of this project was quite straightforward - the creation and delivery of recognised postgraduate training in plant biosecurity. Specifically this was to be done through the creation of university consortium who would share teaching, and the delivery of a 'nested' degree program consisting of a Graduate Certificate, Graduate Diploma and Masters of Plant Biosecurity.

The stated objectives of the research project were:

Objective 1: Create a consortium of universities able to share in the delivery of a national postgraduate curriculum in plant biosecurity.

Objective 2: An expert advisory group created to advise in curriculum coverage and content.

Objective 3: The delivery of a national postgraduate curriculum in plant biosecurity.

In meeting Objective 3, the curriculum partially meets the recommendation by the Beale Review[1] that "*The National Biosecurity Authority should work with state and territory agencies, professional associations and higher education providers to develop a general biosecurity course to be incorporated in health, environmental, marine biology, veterinary and agriculture science curricula. All staff employed in the National Biosecurity Authority should be taught an appropriate adaptation of the general biosecurity course upon commencement of their employment in the agency.*"

The need for a postgraduate curriculum in plant biosecurity was also an explicit recommendation of a national review of plant biosecurity protocols (Angostino *et al*., 2005)[2], initially commissioned and subsequently approved for implementation by Primary Industries Standing Committee (PISC) in February 2006.

This project also contributed to the strategic objective of CRCNPB Program 6, Education and Training, through the provision of training programs for research staff and students to enhance skills, develop industry awareness, and ensure that Australia has the highest quality plant biosecurity research community. Specifically, it met the listed action of "*support[ing] the development of a national curriculum in plant biosecurity.*"

[1] Beale R, Fairbrother J, Inglis A, Trebeck D (2008) One biosecurity – a working partnership. Commonwealth Government: Barton, ACT Australia. 298 pp

[2] Angostino, A., Clarke, A.R., Grimm, M., Hamilton, G., Maynard, G., McKirdy, S., Perret, K. & Roberts, W. (2005) *Report of the Standards Working Group on the Implementation of the Review of Plant Research Protocols*. Published by the Office of the Chief Plant Protection Officer, Australian Government Department of Agriculture, Fisheries and Forestry, in collaboration with the Standards Working Group, Canberra.

3. Key findings

Details on the establishment of a consortium of universities to deliver postgraduate education in plant biosecurity

Five Australian universities have undertaken a contractual arrangement to jointly deliver postgraduate education in plant biosecurity. These universities are: Charles Darwin University, LaTrobe University, Murdoch University, the Queensland University of Technology and the University of Adelaide.

The consortium model chosen for the group has the universities being one of two types: *delivering universities* both award the degrees and teach into the degrees, while *non-awarding* universities teach into the degrees, but do not award. Each of the delivering universities (LaTrobe University, Murdoch University, the Queensland University of Technology) offer all curriculum units (nine course work units plus postgraduate research units) and a student enrols at one of these universities (this becomes the student's 'home' university). The home universities themselves, however, only have responsibility for teaching from one to three of the nine coursework units. The other units are taught on behalf of the home university by the other universities, on a 'fee-for-service' basis. The institutions responsible for delivering each unit are given in Table 1.

Through this model, students only ever enrol in one institution. This makes enrolment management for the student much easier than continually cross-enrolling. It also overcomes problems associated with doing a minimum percentage of your degree from a single institution in order to graduate from that institution. Because of the large number of institutions involved for a small number of units, this was a real issue for most institutions in the consortium. By a student enrolling only at a single university, this issue is no longer a problem.

Table 1: List of course units and delivery arrangements within the national Curriculum for Plant Biosecurity

Unit / Semester offered	Delivering Institution
Semester 1	
1. *Biosecurity Plant Pests – Invertebrates*	QUT
2. *Biosecurity Plant Pests – Pathogens*	LTU
3. *Biosecurity Plant Pests - Weeds*	UA
4. *Detection and Diagnostics*	MU

5. *Plant Biosecurity in Practice*	MU
Semester 2	
6. *Invasion Biology: Ecological foundations of biosecurity*	UA
7. *Risk Assessment: Social, Environmental, Economic and Mathematical*	QUT
8. *Community engagement and participation*	CDU
9. *Policy Framework Obligations*	QUT
Semester 3	
0-16. *Research electives*	QUT, LTU, MU

Details on the development of the postgraduate curriculum in plant biosecurity

The development of the curriculum involved significant consultation with the biosecurity profession, both at state, national and international levels. Professional engagement was significantly advanced through the efforts of Dr Glynn Maynard, Office of the Chief Plant Protection Officer (OCPPO), DAFF. Dr Maynard's (and OCPPO's) efforts on behalf of the Consortium were substantial and important on a number of fronts - ensuring industry relevance was one of these.

During the life of the project, multi-day, face-to-face meetings of all consortium members were held two to three times per year. Telephone and email communications happened on a routine basis as needed. In the final six-months before the consortium agreement was signed, legal representatives from each of the universities were also highly involved in the project. Within each university, significant discussions concerning teaching, finances and the technology implications of the project and delivery style were also held.

From a pedagogical view point, the Masters of Plant Biosecurity eventually consisted of eight course-work units and several research units, taught over an 18 month or two year time-frame (the duration delivers depending on qualifications at entry). The Graduate Certificate comprises Semester 1 units only (as per Table 1), the Graduate Diploma Semester 1 and Semester 2 units. An individual student may enter, or leave, the program at any one of these three degree points.

All units were written from scratch, targeting the biosecurity profession and written expressly for remote delivery using the Articulate (www.articulate.com) suite of e-learning programs. In the original application it was assumed we would be able to bring previously existing

units into the degrees, but in practice we found this could not be done. Even the introductory biology units could not be directly translated from existing units. In contrast, the research units are generic and allow independent, work-place research. Nine units are offered in the Graduate Diploma (Table 1), although only eight are needed. Of the three "*Biosecurity Plant Pest*" units (semester 1), only two are done by a student. We assumed that most people entering the course would have a background in at least one of the biological areas and so we expanded the offering to give greater choice.

Each delivering university had to undergo normal internal course approval in order to be able to award the degrees. For non-delivering universities (Adelaide and CDU), the individual units which they teach have been approved. The development of a web presence was considered an important component of the Plant Biosecurity Curriculum and a preliminary site hosted by the CRC National Plant Biosecurity was replaced with a dedicated web-site in January 2010. The Curriculum's web site (http://plantbiosecurity.edu.au/) offers a useful summary of the plant biosecurity program.

Details on the delivery of the national postgraduate curriculum in plant biosecurity

Delivery of the Curriculum began in Semester 1, 2010, following the first enrolments at Murdoch University. QUT and LaTrobe are expected to offer enrolments from Semester 1, 2011.

To date (end June 2010), we have six students enrolled in the Graduate Certificate, two in the Diploma, one in the Masters and one cross-enrolment, for a cohort of 10 students. All students are currently part-time (which we expected would be of dominant enrolment type) and come from DAFF or the state departments of agriculture in Victoria and Western Australia. This is a positive reflection on uptake of the course by industry professionals. By the end of 2010 (based on current enrolments), at least one student will have taken each of the course-work units with the exception of *Biosecurity Plant Pests – Weeds* and *Policy Framework Obligations*. Based on informal emails, we expect the cohort size to increase in second semester 2010, including our first international student (a plant biosecurity professional from the Seychelles).

The consortium is satisfied with a first year cohort of at least 10 students. Enrolments for Semester 1, 2010 were open for only a short window following the final execution of the consortium agreement and so getting 10 students was pleasing. A smaller cohort also allows for feedback and unit modification before anticipated larger enrolments begin in 2011. Feedback has been solicited from the students and has so far been very positive. General comments include:

- Thank you for a very pleasant return to study. Some stressful moments at times but it will always be like that.
- Excellent course and very relevant, I hope you've had a good uptake on it.

- Haven't studied for 15 years & never online, interesting experience and a pleasant return to study.
- Easy to understand format for delivery, timelines for study/ assignments/ quizzes was good.
- It has been very enjoyable to do the course!
- The lecture material was very good, very useful!
- Very relevant and useful.

4. Implications for stakeholders

The availability of the plant biosecurity degrees has major implications for stakeholders. The education provided will increase breadth and quality of knowledge of people working in the plant biosecurity sector. While this will hopefully increase the general quality of plant biosecurity within Australia, it also has more specific benefits. Firstly, the degrees will aid employers by allowing them to up-skill staff through externally recognised avenues. Secondly, for those wishing to enter the biosecurity field, it will offer an avenue of formal training not currently available. Both of these benefits are in-line with recommendations of the Beale Review.

5. Recommendations

The running of these degrees has marginal, if any, economic benefit for the universities. If these degrees are to become a routine part of the Australian plant biosecurity system, then some level of ongoing financial assistance may be required.

6. Plain English website summary

Please complete table using plain English. This information will be published on CRCNPB's website for a public audience.

CRC project no:	CRC50047
Project title:	*A National Postgraduate Curriculum for Plant Biosecurity*
Project leader:	A/Prof Anthony R Clarke (QUT)
Project team:	Dr Kirsty Bayliss (Murdoch Uni) A/Prof Mike Keller (Uni Adelaide) Dr Kim Plummer (LaTrobe Uni) Dr Glynn Maynard (DAFF, OCPPO) Dr Penny Wurm (Charles Darwin Uni)
Research outcomes:	The project has developed new collaborative arrangements between universities, which allow the teaching of specialist degrees for which no one university may have the required expertise. The university consortium developed for this project consists of Charles Darwin University, La Trobe University; Murdoch University, the Queensland University of

	Technology and the University of Adelaide. Working together, the universities have developed, and are delivering, postgraduate training in plant biosecurity. Specifically, and as of the start of 2010, it is now possible to undertake flexibly delivered units leading to a Graduate Certificate, Graduate Diploma, or Masters of Plant Biosecurity. These units can be undertaken on a full-time or part-time basis and are designed to align with work place requirements. Information on the courses can be found at http://plantbiosecurity.edu.au/
Research implications:	Formal, tertiary level training in plant biosecurity is now available in Australia. This is important for lifting the standard of plant biosecurity in Australia, and for ensuring international best practice.
Research publications:	KL Bayliss, AR Clarke, KS Gibb, M Keller and K Plummer (2007) A National Postgraduate Curriculum in Plant Biosecurity. Proceedings of the 16th Biennial Conference of the Australasian Plant Pathology Society, Adelaide September 2007. KL Bayliss and S. McKirdy (2008) Plant biosecurity education and training in Australia. In: proceedings of the 9th International congress of plant pathology, Torino, Italy August 24-29 2008. KL Bayliss (2010) Strategies to increase plant biosecurity capacity in Australia. In: Proceedings of 1st Global Biosecurity Conference, Brisbane Australia February 28-March 3 2010. P 105
Acknowledgements:	The Universities of the Plant Biosecurity Curriculum would like to acknowledge the funding provided by the Australian Government Department of Education, Employment and Workplace Relations through the Collaborative and Structural Reform Grant (CASR) scheme. The Australian Government Department of Agriculture, Fisheries and Forestry, through the Office of the Chief Plant Protection Officer, also made significant contributions to the project through the in-kind and operating support of Dr Glynn Maynard. DIISR supported the Curriculum project through the Cooperative Research Centres Scheme.