

National Plant Health and Biosecurity Project delivers benefits for Australian production nurseries

In this month's nursery paper Dr Andrew Manners and Dr Lindy Coates of the Queensland Department of Agriculture & Fisheries provide an update on a levy funded project which has delivered some excellent support for the industries capacity in the areas of plant health and biosecurity.

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Pests and diseases, both endemic and exotic, represent a major threat to the health, productivity and profitability of Australian nursery production businesses, as well as the industries they support. The nursery industry is particularly vulnerable compared to other horticultural and forestry industries, mainly due to the great diversity of plant species (> 10 000 cultivars) involved, and the multitude of pathogens and pests associated with these hosts. Furthermore, the extensive domestic and international movement of nursery stock through commercial trade creates significant plant health and biosecurity challenges. As nursery production businesses face pest and disease issues on a daily basis, it is imperative that industry has access to the support needed to both manage their current pest and disease

problems and protect against potential new pest and disease incursions.

The Nursery Production Plant Health & Biosecurity Project has been a four year (2011-2015) funding partnership between the Australian nursery industry, Queensland Department of Agriculture & Fisheries, and Horticulture Innovation Australia (HIA). The aim of the project has been to provide support to the nursery industry in a number of areas, including the identification and management of plant diseases and pests through professional diagnostics, skill enhancement of industry through training workshops and the development of various resources for on-farm biosecurity management. Over the life of the project, a range of outputs have been delivered in the four key areas of diagnostics, training,

information and industry support. These outputs are summarised in this article, while full details will be provided in the HIA Final Report for Project NY11001, which will be available in 2016 from HIA.

Diagnostics

Pest and disease diagnostics have been conducted for the nursery industry under the umbrella of Grow Help Australia, a national diagnostic service operating out of Queensland Department of Agriculture & Fisheries. As part of the project, NIASA accredited businesses from around Australia have been entitled to three complimentary diagnostic samples and one complimentary soil test (Phytophthora) per year. The project also provided discounted diagnostics to all Australian nursery businesses, irrespective of status, membership or affiliation.

Table 1 summarises pest and disease diagnostics conducted by the project team over the period November 2011 – August 2015. The total number of nursery, NIASA and virus indexing samples processed through Grow Help Australia increased significantly over the life of the project. The project team handled a total of 316 different plant hosts and 180 different plant pathogens over this period (data not shown). Fungi and viruses were the predominant pathogens reported, with *Fusarium*, *Pythium*, *Colletotrichum* and *Rhizoctonia* species being the most common fungal pathogens isolated from samples.



Ongoing capacity development in areas around plant health and biosecurity is essential for the nursery industry

Table 1: Summary of samples processed through Grow Help Australia¹ over the life of the Plant Health & Biosecurity Project

Year	Total no. of Grow Help samples ²	Total no. of nursery samples ³	Total no. of NIASA samples	Total no. of virus indexing samples
2011 (Nov/Dec only)	16	6	1	-
2012	122	61	31	-
2013	245	92	54	-
2014	450	177 ⁴	71	2,310
2015 (Jan – Aug only)	300	136	63	3,165
TOTAL	1,133	472	220	5,475

¹ <https://www.daf.qld.gov.au/plants/health-pests-diseases/plant-pest-diagnostic-services/grow-help>

² Excludes virus indexing samples, includes non-nursery (e.g. field grown fruit and vegetable crops, forestry species) and nursery samples.

³ Includes NIASA samples.

⁴ This equates to receiving about 3-4 nursery samples every week.



Phytophthora lupin baits indicating that the sample above is healthy and the sample below infected.



Healthy *Azalea* (left) and growing tip with broad mites (right)

Training

A series of training workshops on the recognition of key pest and pathogen groups affecting production nurseries, as well as integrated pest management strategies, were conducted in each state/territory. In most cases, one workshop per year was delivered in each state/territory. Attendance numbers and feedback from workshop participants are summarised in **Table 2**.

Table 2: Attendance numbers and participant feedback for workshops conducted between 2011 and 2015 for the Plant Health & Biosecurity Project.

State/Territory	No. of workshops	Total no. of participants	Average no. of participants per workshop	Mean overall benefit (1-5 scale) ¹
WA	4	105	26.0	4.4
SA	4	122	30.5	4.4
VIC	4	136	34.0	4.4
TAS	3	62	20.7	4.7
NSW/ACT	4	118	29.5	4.6
QLD	8 ²	235	29.4	4.6
NT	4	75	18.8	4.5
TOTAL	31	853	27.5	4.5

¹ Workshop participants evaluated overall benefit of each workshop using a 1-5 scale where 1=poor and 5=excellent. Results averaged over all workshops conducted in each state.

² Three of the eight QLD workshops were additional workshops funded directly by NGIQ, and one of the eight workshops was conducted as part of the NGIA National Conference at the Gold Coast in 2012.

Information

Factsheets

A series of 24 factsheets on common nursery pests and pathogens, as well as key biosecurity threats, were produced over the life of the project (**Table 3**). These are available from the NGIA website¹. However, the last six factsheets listed in Table 3 will be made available in early 2016.

Title of factsheet

Alternaria diseases in production nurseries
 Asiatic citrus psyllid – a biosecurity threat
 Bacterial diseases in production nurseries
 Bacterial leaf scorch – a nursery industry biosecurity threat (Pierce's disease)
 Fire blight: a biosecurity threat to the Australian nursery industry
 Fusarium: a formidable nursery pathogen
 Glassy winged sharpshooter – a nursery industry biosecurity threat
 Huanglongbing – a nursery industry biosecurity threat
 Managing green peach aphid in production nurseries
 Managing silverleaf whitefly in production nurseries
 Managing two-spotted mite in production nurseries
 Managing Western flower thrips in production nurseries
 Phytophthora diseases – problematic in the nursery and beyond
 Phytophthora ramorum: a biosecurity threat to the Australian nursery industry
 Protect your nursery from virus diseases
 Pythium species: a constant threat to nursery production
 Rhizoctonia: a variable and versatile nursery pathogen
 The biology and management of Colletotrichum diseases in production nurseries
 Scale insects – a hard problem that can be managed
 Mealy bugs – a pest of a different scale
 Cycad blue butterfly – a pretty name for an ugly problem
 Root and leaf nematodes – microscopic worms with major consequences
 Powdery mildew – a myriad of nursery pathogens
 Downy mildew – early management is critical



Leaf spot caused by the fungus, *Pseudocercospora*, on leatherleaf fern.

1 Available at: https://www.ngia.com.au/Category?Action=View&Category_id=682

Nursery papers

Four nursery papers were produced on pest and disease management during the project (Table 4). These are available from the NGIA website¹.

Table 4: Nursery papers produced over the life of the Plant Health & Biosecurity Project

Title of nursery paper	Issue
Cylindrocladium diseases of nursery plants	September 2012, Issue no. 8
Management of fungus gnats in nursery production	June 2013, Issue no. 5
Accurately diagnosing weeds, pests and diseases affecting nursery crops	February 2014, Issue no. 1
National plant health and biosecurity project delivers benefits for Australian production nurseries	November 2015, issue no .10

1 Available at: http://www.ngia.com.au/Section?Action=View&Section_id=46

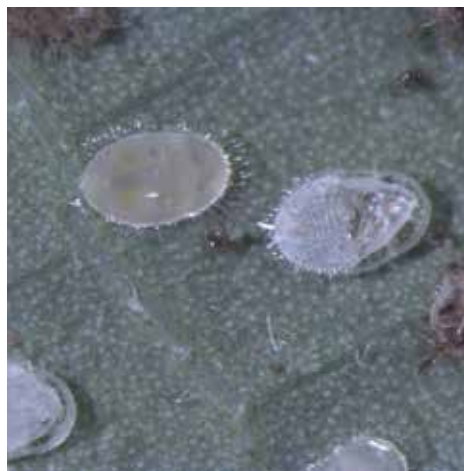
Pest management plans

Detailed pest management plans were produced for three key pest groups (fungus gnats, whiteflies and mites) as well as for soilborne diseases of nursery crops (Table 5). These are available from the NGIA website¹.

Table 5: Pest management plans produced over the life of the Plant Health & Biosecurity Project

Title of pest management plan
Fungus gnat pest management plan for production nurseries
Integrated pest management plan for whiteflies in production nurseries
Soilborne root pathogens in production nurseries
Mite pest management plan for production nurseries

1 Available at: https://www.ngia.com.au/Category?Action=View&Category_id=689



Close-up of glasshouse whitefly on avocado. The upper most individual has not emerged as an adult, the other individuals have already emerged.

Pest ID tool

Approximately 50 pest and disease descriptions as well as hundreds of high quality images were provided for the Nursery Industry's Pest ID tool¹ over the course of the project (Table 6). This web-based information package is designed to

assist nursery producers in identifying and managing pests, diseases, disorders and weeds. It also includes information on beneficial insects as biocontrol treatments. The Pest ID tool can be used on any device that has web-browsing capabilities.

Table 6: Pest and pathogen descriptions and images² provided for the nursery industry's electronic pest ID tool

Year 1	Year 2	Year 3	Year 4
Phytophthora	Phoma	Azalea leaf gall	American serpentine leaf miner
Pythium	Frangipani rust	Camellia leaf gall	Bean aphid
Rhizoctonia	Pelargonium rust	Ash whitefly	Poinsettia thrips
Cylindrocladium	Gliocladium	Southern red mite	Serpentine leaf miner
Fusarium	Bipolaris	Black vine beetle	Pierce's spider mite
Colletotrichum	Cycad blue butterfly	Vegetable leaf miner	False codling moth
Alternaria	Impatiens necrotic spot virus	Root knot nematodes	Tomato/potato psyllid
Botrytis	Cucumber mosaic virus	Honey fungus	Summer fruit tortix
Chalara	Tomato yellow leaf curl virus	Bacterial wilt	Colorado potato beetle
Powdery mildew	Tomato mosaic virus	Cypress canker	Western plant bug
		Apple scab	Bacterial canker
		Red-shouldered leaf beetle	Dutch elm disease
		Hibiscus beetle	Zebra chip
		Garden weevil	Fire blight
			Phytophthora blight

¹ Available at: <https://pestid.com.au/>. State-based NGI members receive 40% discount

² Many additional images without associated descriptions were also provided.

Industry support

Pest contingency plans

Four pest specific contingency plans were developed during the course of the project (Table 7). These provide background information on pest biology and available control measures to assist production nurseries with preparedness for an incursion into Australia, as well as guidelines and options for steps to be undertaken and considered when developing a Response Plan. Copies of these plans can be obtained by contacting NGIA. Huanglongbing and fire blight contingency plans are also currently available on the Plant Health Australia website.

¹ Currently available at:

<http://www.planthealthaustralia.com.au/wp-content/uploads/2014/11/Huanglongbing-CP-NG-2013.pdf>

² Currently available at: <http://www.planthealthaustralia.com.au/wp-content/uploads/2014/11/Fire-blight-CP-2014.pdf>

Table 7: Pest specific contingency plans developed for the nursery industry as part of the Plant Health & Biosecurity Project

Title of pest contingency plan
Threat specific contingency plan for huanglongbing and its vectors ¹
Threat specific contingency plan for fire blight ²
Threat specific contingency plan for giant African snail
Threat specific contingency plan for Dutch elm disease

EPPRD (Emergency Plant Pest Response Deed) support

The project team has also provided technical support to industry in relation to 18 EPP (emergency plant pest) incursions over the life of the project, particularly in relation to supplying information on pest biology, host range and management.

Project Team

Department of Agriculture & Fisheries (DAF) Queensland: Andrew Manners, Lindy Coates, Tony Cooke, John Duff, Jan Dean, Ken Pegg and Leif Forsberg (November 2011 – September 2013).

NGIQ: John McDonald; NGIA: Anthony Kachenko, Chris O'Connor (August 2014 - present)

Further information on this project is available from Lindy.Coates@daf.qld.gov.au

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