
**Queensland Biosciences Precinct**
**The University of Queensland**
**Brisbane, Australia**

**27th-29th March 2008**

**www.uq.edu.au/plants/icbpi/**

*ICBPI Program*

*and*

*Book of Abstracts*

***Sponsors***

The University Of Queensland AUSTRALIA

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Journal of Experimental Botany

New Phytologist

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**on behalf of Journal of Plant Interactions**

American Society of Plant Biologists 1924

Plant Physiology
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MOLECULAR ECOLOGY

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# Welcome to ICBPI !

On behalf of the Organising Committee it is my pleasure to welcome you at the first INTERNATIONAL CONFERENCE ON BIOTIC PLANT INTERACTIONS.

The idea for this conference stems from the fact that traditionally **plant-microbe** and **plant-insect interactions** have been looked at as two separate issues. High-throughput approaches using genomics, proteomics and metabolomics have revealed a clear overlap between plant-microbe and plant-insect interactions. A global picture emerges of the networks underlying the physiological pathways that result in beneficial interactions or plant defence responses.

The International Conference on Biotic Plant Interactions is bringing together scientists, industry delegates and students who are interested in molecular plant pathology and beneficial interactions of plants with other organisms, including viruses, bacteria, fungi, oomycetes, parasitic plants, nematodes, insects and other herbivores. Speakers and poster presenters are encouraged to give a special emphasis on overlaps between plant-insect and plant-microbe interactions. Abstracts in this book will be also made available online on www.uq.edu.au/plants/icbpi/.

Please do not hesitate to contact any of the organising staff or myself if we can be of any assistance. Many thanks to the sponsors and thank you for attending ICBPI 2008.

Peer Schenk

## Organising Committee and Participating Organisations

Peer SCHENK (Chair )

John MANNERS

Peter GRESSHOFF

Myron ZALUCKI

Richard OLIVER

André DRENTH

Richard BURNS

German SPANGENBERG

Michael MASON

Julie-Ann HARLOW (finance)

Imogen BARNACLE

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ARC CENTRE OF EXCELLENCE FOR INTEGRATIVE LEGUME RESEARCH

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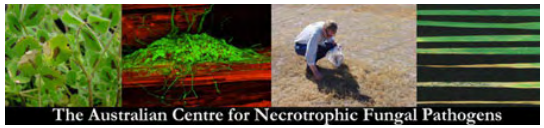

# ICBPI Program

**Thursday, 27 March 2008**

**8.00 am** **Registration** (tea and coffee served on arrival)

**8.45 am** **Welcome and Conference Opening (Peer Schenk)**

**Session 1: Molecular Recognition and Signalling**
**Chair: Brett Tyler**

9.00 am Plenary talk: Pathogen effector proteins in plant innate immunity. (Brian Staskawicz) (sponsored by New Phytologist)
9.35 am Plenary talk: Genetic analysis of PAMP-triggered immunity in *Arabidopsis.* (Cyril Zipfel) (sponsored by Francis & Taylor on behalf of Journal of Plant Interactions)
10.10 am Durable broad-spectrum powdery mildew resistance in crops and cereals: What can we learn from Arabidopsis? (Matthew Humphry)

**10.35 – 11.00 am Morning tea break**

**Chair: Brian Staskawicz**
11.00 am Plenary talk: Cross-talk between pathogen and insect defense signaling. (Corné Pieterse) (sponsored by Plant Physiology)
11.35 am Early stage mortality and foraging behaviour of Lepidoptera on their host plants: traversing a treacherous landscape (Myron Zalucki)
12.00 pm The role of PnVsv in the adhesion of *Phytophthora nicotianae* spores. (Leila Blackman)
12.20 pm Soybean nitrogen fixation is dependent on the activity of the novel peribacteroid membrane-bound transcription factor, GMSAT1. (Brent Kaiser)

**12.40-1.30 pm Lunch**

**Session 2: Plant Defence Mechanisms**
**Chair: Richard Oliver**

1.30 pm Plenary talk: The plant cell wall: the first line of defense. (Shauna Somerville) (sponsored by Journal of Experimental Botany)
2.05 pm Plenary talk: Priming plants for stress resistance: the role of ABA. (Brigitte Mauch-Mani)
2.40 pm A novel role for Mediator in plant disease resistance. (Kemal Kazan)
3.05 pm Resistance to sap-sucking insect pests in a model legume *M. truncatula.* (Karam Singh)

**3.30 – 3.50 pm Afternoon tea break**

**Chair: Shauna Somerville**
3.50 pm Plenary talk: Functional analysis of *Arabidopsis* transcription factors using novel gene silencing system (CRES-T). (Masaru Ohme-Takagi)
4.20 pm Endocytosis and recycling of RLK is associated with race-specific resistance in rice. (Zuhua He)
4.40 pm Camalexin-mediated *Arabidopsis—Botrytis* interactions: exploring variation for signaling and resistance. (Heather Rowe)
5.00 pm The transcription factor AtMYC2 shapes plant defense responses in A*rabidopsis* upon *Pieris rapae* herbivory. (Adriaan Verhage)
5.20 pm A role for lipid oxygenation in wheat during defence against the Russian wheat aphid? (Amie van der Westhuizen)
5.40 pm Molecular regulation and manipulation of defensive alkaloids in *Nicotiana.* (John Hamill)

**6.00 pm Poster Session**

**7.30 pm Dinner at the UQ Staff House** (Building 41), Staff House Road (please register and pay for dinner at the help desk)

**Friday, 28 March 2008**

**Session 3: Co-evolution and Ecology**
**Chair: André Drenth**

8.30 am Plenary talk: Bioinformatics and functional genomics of the *Phytophthora* infection. (Brett Tyler) (sponsored by Journal of Experimental Botany)
9.05 am Multiple host-specific toxins, lateral gene transfer and gene loss in the evolution of cereal Pleosporalean pathogens. (Richard Oliver)
9.30 am Waving a red flag: The role of anthocyanin pigments in anti-herbivore defence. (Kevin Gould)
9.55 am The African sugarcane stalk borer *Eldana saccharina* walker (Lepidoptera: Pyralidae): host-plants, non-host plants and endophytic fungi. (Richard Stuart Rutherford)

**10.20-10.40 am Morning tea break**

10.40 am Cyclotides: Cyclic knotted proteins from plants. (David Craik)

**Session 4: Plant Biotechnology**
**Chair: Xiao-Ya Chen**

11.00 am Plenary talk: Biocontrol fungi act as plant symbionts and affect other biotic plant interactions. (Matteo Lorito)
11.35 am Field bioassay of peach host-plant volatiles attractive for oriental fruit moth *Grapholita molesta* Busck (Lepidoptera: Tortricidae). (Alexandre Il-Ichev)
12.00 pm Effect of variety or rootstock on biochemical defences and postharvest disease development in mango and avocado. (Elizabeth Dann)

**12.25-1.15 pm Lunch**

1.15 pm Transcriptional reprogramming of defense-related genes in rice plants against leaf folder insects. (Saveetha Kandasamy)

**Session 5: Emerging Areas and Global Change**
**Chair: Matteo Lorito**

1.40 pm Plant-mediated insect gene silencing – a new approach to dissecting plant-insect interactions and pest control. (Xiao-Ya Chen)
2.05 pm Climate change impacts on plant defence chemistry: an integrated analysis. (Ros Gleadow)
2.30 pm *Pongamia pinnata*, the legume to drive the Australian biodiesel industry of the future. (Paul Scott)
2.55 pm Opening the black box of soil microbial interactions through metatranscriptomics. (Ken McGrath)

**3.20 - 3.40 pm Afternoon tea**

**3.40 – 5.30 pm Poster Session (please attend your poster)**

**6 pm Cocktails and Social Mixing**

**Saturday, 29 March 2008**

**Biotic Plant Interactions Discussion Session**
**Chair: John Manners**

8.00 am Signal analysis during systemic regulation of legume nodulation. (Peter Gresshoff)
8.20 am Cross-talk between signaling pathways to fine-tune defense. (Antonio Leon-Reyes)
8.40 am Genetic dissection of resistance to soil-borne necrotrophic pathogens in *M. truncatula*. (Jonathan Anderson)
9.00 am Roles of the N-terminal TIR domain of plant disease resistance proteins. (Jeff Ellis)
9.20 am Isolation and functional characterisation of a cluster of TIR-NBS-LRR genes linked to powdery mildew resistance in grapevine. (Ian Dry)

**9.40 – 10.00 am Morning tea break**

**Chair: Peer Schenk**

10.00 am Unexpected transcript diversity in Russian wheat aphid salivary proteins. (Owain Edwards)
10.20 am The *Platypus quercivorus-Raffaelea quercivora* complex kills living *Quercus crispula* by the pheromone mediated mass attack of the ambrosia beetle. (Tadakazu Nakashima)
10.40 am *Caladenia* (Orchidaceae) populations are associated with a range of *Sebacina vermifera*-like fungi with different functionality. (Magali Wright)
11.00 am Molecular identification of mycorrhizal fungi in Australian threatened plant species. (John Dearnaley)
11.20 am Establishment of a functional genomics platform for *Leifsonia xyli* subsp. *xyli.* (Steve Brumbley)

**11.40 am Closing Remarks and Award of Best Student Poster Prizes**

**12.00 – 12.50 pm Lunch**

**<u>Recreational program (book on Thursday morning at the help desk)</u>**

**Saturday 29 March 2008**

**1.00 pm** Trip to Lone Pine Koala Sanctuary
(meet opposite the bus stop for a UQ shuttle)

**Sunday 30 March 2008**

**7.30 am** Trip to North Stradbroke Island
(register and pay at the help desk)

# ABSTRACTS

## Molecular identification of mycorrhizal fungi in Australian threatened plant species

**John D.W. Dearnaley, Alex F. Downie, Andrew J. Murray & Andrew F. Le Brocque**

*Australian Centre for Sustainable Catchments*
*The University of Southern Queensland*
*Toowoomba, AUSTRALIA*

Mycorrhizas are interactions between fungi and plant roots whereby plants receive inorganic nutrients in return for providing carbon to their fungal partners. There is considerable evidence that different assemblages of mycorrhizal fungi in soils can have specific impacts on plant communities. This has important implications for threatened plant species and indicates that associated mycorrhizal fungi must be identified prior to conservation procedures. Molecular methods based on PCR amplification of taxonomically important DNA regions are currently being utilized for mycorrhizal fungal identification in threatened Australian native plants. DNA can be extracted from plant root samples which contain difficult to culture mycorrhizal fungi and fungal DNA selectively amplified using fungal specific primers. Cloning and sequencing of amplicons, followed by database searching for closest species matches has revealed an array of previously undocumented mycorrhizal fungal taxa and addressed a number of important ecological questions. In the vulnerable orchid *Dipodium hamiltonianum*, these techniques have identified ectomycorrhizal fungi as the main partners of the species, highlighting the interconnectedness between orchid, fungus and local tree species and the importance of habitat retention for protection of orchid populations. Molecular taxonomic techniques are currently being used to identify the mycorrhizal partner of the endangered orchid *Arachnorchis atroclavia* so that plants can be successfully grown horticulturally and the distribution of the fungal symbiont determined in natural localities prior to species reintroductions. In the vulnerable native pea, *Sophora fraseri*, PCR, cloning and sequencing of root fungal DNA have shown that the plant preferentially associates with certain arbuscular mycorrhizal fungi - a finding that may explain why horticultural growth of the plant is variable in success. Molecular taxonomic techniques can thus reveal much about the previously hidden, below ground interactions between mycorrhizal fungi and plant roots and will continue to contribute significantly to conservation of many of Australia's threatened plant species.

## Establishment of a functional genomics platform for *Leifsonia xyli* subsp. *xyli*

**Stevens M Brumbley[1,2,3], Lars Petrasovits[1,2,3], and Scott Hermann[1,2]**

*[1]Bureau of Sugar Experiment Stations, David North Plant Research Centre, 50 Meiers Rd, Indooroopilly, Queensland, 4068, Australia*
*[2]Cooperative Research Centre for Tropical Plant Protection, John Hines Bldg, The University of Queensland, St. Lucia, Queensland, 4072, Australia*
*[3]Australian Institute for Bioengineering and Nanotechnology, The University of Queensland, St. Lucia, Queensland, 4072, Australia*

*Leifsonia xyli* subsp. *xyli* (*Lxx*), the casual agent of ratoon stunting disease (RSD) of sugarcane, is a xylem-limited, nutritionally fastidious, slow growing, gram-positive coryneform bacterium. RSD is economically the most important disease of sugarcane worldwide. Because of the difficulties in growing this bacterium in pure culture, little is known about the molecular mechanisms of pathogenesis. The full genome sequence of *Lxx* has been completed by the Agronomic & Environmental Genomics group in the state of São Paulo, Brazil. To complement this work we have produced 712 *Lxx*::Tn*4431* transposon (Tn) mutants and mapped the position of 358 onto the *Lxx* genome map using a rapid PCR-based approach. Although a small number of Tn*4431* insertions were found to be scattered throughout the *Lxx* genome, the majority (85%) were found to have inserted into a 150kb region while an additional 23 insertions were found to be in multiple copy regions (2 to 25copies) of the Lxx genome and therefore can not be accurately mapped. The Tn*4431* mutant library was screened for individuals unable to colonise sugarcane, and one non-colonising mutant was found. The site of Tn insertion was identified and 10 kb of the surrounding region sequenced. Complementation using a cosmid containing the wild type *Lxx* sequence indicated that colonisation could be restored. However, whether the disrupted gene is involved in colonisation or whether the mutant is simply more auxotrophic than wild type *Lxx* is the subject of further research.

# ABSTRACTS OF POSTER PRESENTATIONS

**Effect of different levels of soil compaction on growth and root nodulation of mung bean (*Vigna radiata)***

**Javed I. Mirza* and Kiran Gul**

*Institute of Biology, Bahauddin Zakariya University, Multan, Pakistan*

The effect of different levels of soil compaction on growth and root nodulation of mung bean (*Vigna radiata* {L.} R. Wilczek*)* cultivar NM-51 was studied in pot experiment under natural conditions. The soil compaction treatments were control (soil, hard), T1 (3 soil : 1 sand), T2 (2 soil : 2 sand) and T3 (1 soil : 3 sand). The soil compaction treatments were applied at the time of sowing. The plan of the experiment was completely randomized design (CRD) with nine replicates for each treatment at each harvest. The four harvests were taken at the following developmental/physiological stages: start of flowering, start of pod formation, middle of pod formation, and seed maturity. A number of growth parameters were used to collect data at each harvest. The data was subjected to statistical analysis by applying Analysis of Variance (ANOVA) and the means were compared by Duncan's Multiple Range Test (DMRT). The Increasing soil compaction treatments generally showed increasing adverse effect on various parameters of vegetative growth, reproductive growth and root nodulation of mung bean. The adverse effects of soil compaction were more prominent on root nodulation compared to vegetative and reproductive growth.

## Endophytic fungi associated with rainforest and non rainforest flora in south-east Queensland

**Morwenna Boddington and John D.W. Dearnaley**

*Australian Centre for Sustainable Catchments, The University of Southern Queensland, Toowoomba, AUSTRALIA*

Fungal endophytes are fungi living inside plant tissues but causing little detriment to the host. Documentation of the fungal endophytes of the worlds' tropical and subtropical flora is only a recent undertaking. The discovery that rainforest tree species can harbour dozens of unique fungal endophyte species suggest that these organisms constitute a large proportion of global fungal biodiversity.

The dry schlerophyll and rainforests of South East Queensland have a high plant diversity and possibly a correspondingly diverse endophyte mycoflora. To date, little attention has been focused on these ecosystems from a fungal perspective. As these ecosystems are under threat from clearing for agriculture and urbanisation and other human-based disturbances, it is paramount that the fungal endophyte communites of these regions are fully documented before they are irrevocably lost. A portion of the endophytic mycoflora of thirteen native and one exotic plant species found in the Toowoomba region in south-east Queensland has been examined. While the fungi isolated are part of a larger project involving the search for novel anti-microbial compounds, this presentation will focus on the description of the number and types of fungi encountered. Over 600 isolates were obtained, with approximately 70 species represented. As so few plant specimens produced so many fungal types, it is clear that these areas contain a diverse and extensive population of endophytic fungi.

## Comparative effects of arbuscular mycorrhizal on water relations of maize and bean under drought-stressed conditions.

**H.R. Asghari and M.R Amerian**

*Faculty of Agriculture, Shahrood University of Technology, Shahrood. P.O.Box : 3619995161-31, IRAN*

Arbuscular mycorrhizal (AM) fungi living symbiotically with host plants enhance plant growth by improving the acquisition of mineral nutrients and water relations. This study determined the effects of AM fungi inoculation on water relations in maize (*Zea mays* L.) and bean (*Phaseolus vulgaris* L.) under water-stressed and well-watered conditions. Maize and bean plants were grown under three levels of inoculation, with or without fungi *Glomus mosseae* and *Glomus interaradices* in a sandy loam soil in greenhouse conditions. Drought stress was imposed after 11 weeks of plant growth. Under stressed conditions and after rewatering, leaf water potential, transpiration and stomatal conductance of plants were measured. The results of this study showed that leaf water potential and stomatal conductance in mycorrhizal plants were significantly greater than the non-mycorrhizal plants during the stressed period in both plant species. During recovery from drought stress, leaf water potential of mycorrhizal maize plants were mostly higher than those of non-mycorrhizal maize plants, particularly in those that were infected by *G. mosseae.* Significant differences in leaf water potential, transpiration rate and stomatal conductance were found during recovery from drought stress in mycorrhizal bean plants infected by *G. interaradices*. Positive correlation between transpiration rate with stomatal conductance in maize and bean was seen and this correlation was higher in $C_3$ (bean) than in $C_4$ (maize) plants particularly in mycorrhizal plants. Arbuscular mycorrhizal inoculation improved water relations and postponed the onset of wilting in both plants.