



ACDC

Australian Cotton Disease Collaboration



A collaborative approach to cotton disease
research to reduce the economic impact of
current and emerging diseases



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Current research projects

- A Systems-based disease control**
- B Understanding pathogen behaviour**
- C Spatial data analytics and modelling**
- D Fungicides and plant defense mediators**

Tier 1 diseases

Black root rot, *Fusarium* and *Verticillium* wilt and *Alternaria* leaf spot

Tier 2 diseases

Rhizoctonia rot, reoccurring wilt, target spot, grey mould and boll rot

A1.2

Irrigation and nutrition management to reduce cotton wilt disease incidence

Location: North Star (Qld) and Darling Downs (Qld) for field sites, Toowoomba (Qld) for glasshouse trials, and Brisbane and Toowoomba for researcher locations

Lead: Linda Scheikowski (Qld DPI), A/Prof Joseph Foley (UniSQ)

- Quantifying the impact that varying irrigation methods and nutrition management have on disease incidence of *Verticillium* and *Fusarium* wilts under different environmental conditions
- Utilising existing field trials in conjunction with ground-truthed and near-to-surface remote sensing to report on disease incidence and severity
- Developing remote sensing that differentiates between *Verticillium* and *Fusarium* wilt diseases

A2.1

Diagnostic development, diagnostic support and cotton pathology collection

Location: Brisbane and Toowoomba, Qld

Lead: Dr Dinesh Kafle(Qld DPI), Dr Murray Sharman (Qld DPI)

- Developing molecular tools for rapid diagnosis of disease and sharing results to growers in a timely manner
- Creating a database of the prevalence and distribution of cotton diseases in Australia
- Collecting isolates of various cotton pathogens and contributing to a centralised pathogen collection, for research in other projects
- Reporting on new strains/pathogens from 2024/25 through to 2027/28 seasons

A2.2

Contribution of cotton residues to inoculum carryover (Phase 1)

Location: Brisbane and Toowoomba, Qld

Lead: Linda Scheikowski (Qld DPI)

- Demonstrating the linkage between inoculum load, soil type, environment practices and yield loss to diseases caused by Tier 1 pathogens
- Providing growers with recommendations of what to do with cotton residues for managing different pathogens, specifically *Verticillium*, *Fusarium* and *Eutypella*

A2.3

Pathogen inoculum: spore trapping to detect aerial spores of cotton pathogens (Phase 1)

A2.4

The black unknown: linking knowledge and innovation for management of black root rot

Location: Charles Sturt University (CSU) (Wagga Wagga) and Cotton Farms (Griffith), NSW

Lead: A/Prof Linda Smith (Qld DPI), Dr Ben Stodart (CSU)

- Understanding etiology of black root rot disease in southern NSW
- Identifying environmental factors influencing black root rot incidence
- Screening biocontrol agents for controlling *Berkeleyomyces rouxiae*, causing black root rot disease
- Microbial profiling of soil samples from healthy and diseased cotton fields
- Building cotton pathology capacity to support cotton growers

A3.1

Pathology support to cotton growers of the NT and WA

Location: NT DAF (Katherine) WA DPIRD (Kununurra)

Lead: A/Prof Linda Smith (Qld DPI), Sarah Nolan-Gorman (WA DPIRD), Dr Edward Mwando (NT DAF)

- Building cotton pathology capacity through establishing a diagnostic service, disease surveillance and pathology training
- A collection of isolates of various cotton pathogens in northern Australia and contribution to a centralised pathogen collection

Current research projects

- Industry gains understanding of cotton pathogen evolution and dynamics of threat to industry expansion in northern regions
- Providing access to information on pathogen origin and distribution



B1.1 Establishing the Australian cotton pathogen collection

Location: UniSQ (Toowoomba Campus)

Lead: Dr Cassy Percy (UniSQ)

- Establishing, maintaining and future direction of centralised, well catalogued Australian cotton pathogen collection
- Report on pathogen distribution in each growing season
- Workshops with cotton pathologists of State and Territory departments on sample collection and pathogen diagnosis based on morphological and molecular characterisation



B1.2 Pathology support to cotton growers and ACDC project activities in NSW

Location: Narrabri, NSW

Lead: Prof Sambasivam Periyannan (UniSQ)

- Cotton pathology capacity built through establishment of diagnostic service and pathology training
- A collection of isolates of various cotton pathogens in NSW and contribution to a centralised pathogen collection
- The Australian cotton industry in NSW gains understanding of cotton pathogen evolution and the dynamics of their threat



B1.3 Monitoring pathogen genetic diversity

Location: UniSQ (Toowoomba Campus)

Lead: Dr Alexandros Georgios Sotiropoulos (UniSQ)

- Producing population genetic datasets for key cotton pathogens
- Understanding genetic factors influencing the evolution of virulence in pathogen population



B1.4 Reference genome for cotton pathogens

Location: UniSQ (Toowoomba Campus)

Lead: Dr Alexandros Georgios Sotiropoulos (UniSQ)

- Producing reference genomes for understudied, emerging and important Australian cotton pathogens
- Developing a critical report on cotton pathogen genome resources availability in public databases with recommendations on how to future proof the industry from diseases caused by Tier 2 fungal pathogens
- Identifying genes and genomic components that could play a role in virulence and resistance



B2.1 Host range and cotton differential set identification for key cotton pathogens

Location: UniSQ (Toowoomba Campus)

Lead: Dr Cassy Percy (UniSQ)

- Identifying cotton host differential set and phenotyping methods for Tier 1 and 2 pathogens
- Generating data on the prevalence of co-infection



B3.1 Coinfection assays to study synergistic and antagonistic interactions

Location: UniSQ (Toowoomba Campus)

Lead: Dr Sadegh Balotf (UniSQ)

- Understanding of the complex dynamics between co-infected pathogens, such as whether their interactions are synergistic or antagonistic, and how these dynamics affect disease progression and severity
- Generating data on the prevalence of co-infection in Australian cotton fields



C1.1 Spatial data analytics and advanced modelling for disease prediction and management in Australia

Location: UniSQ (Toowoomba and Springfield Campus)

Lead: A/Prof Linda Smith (Qld DPI), Prof Ravinesh Deo (UniSQ)

- Practical tools for cotton growers to mitigate crop losses, particularly in emerging cotton-growing regions like Northern Australia by learning from the data and disease prevalence in more established regions in NSW and Qld
- Advanced, data-driven management strategies to mitigate the impact of disease



C1.2 Develop machine vision systems to detect and differentiate verticillium and fusarium wilts

Location: UniSQ (Toowoomba Campus)

Lead: A/Prof Alison McCarthy (UniSQ)

- Developing machine vision sensing to differentiate diseases with similar symptoms (eg. *Verticillium* and *Fusarium* wilts)
- Predicting disease severity before visual symptoms appear



D1.1 Fungicides and plant defense mediators for the Australian cotton industry inferred from national and global analyses

Location: UniSQ (Toowoomba Campus)

Lead: Prof Levente Kiss (UniSQ)

- Understanding the efficacy of fungicides and plant defense mediators used in Australian and overseas cotton production
- Identifying new activities for testing and possible introduction to cotton production



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Contacts

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Domain and project leads

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Project A2.4

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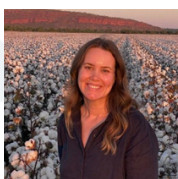
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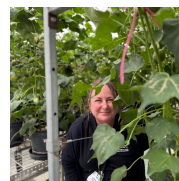
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Projects B1.1 and B2.1

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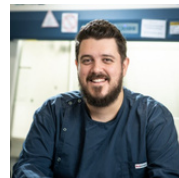
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