



# 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)

A3.1

### Pathology support to cotton growers of the NT and WA

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

**Lead:** Dr Sadegh (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
- 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



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# Current research projects

**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

**B1.5**

## 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

**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



# Contacts

## General ACDC enquiries

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## Domain and project leads

### ACDC Director, Domain B Leader and Project B1.2

#### Prof Sambasivam Periyannan

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### ACDC Deputy Director, Domain A and C Leader and Project C1.1

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### Domain D Leader and Project D1.1

#### Prof Levente Kiss

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### Projects A1.2, A2.2 and C1.2

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### Project A1.2

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### Projects A2.1, A2.3, A3.1

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### Project A2.1

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### Project A3.1

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### Project A3.1

#### Dr Edward Mwando

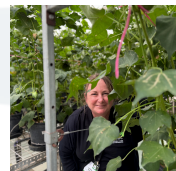
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### Projects B1.1 and B2.1

#### Dr Cassy Percy

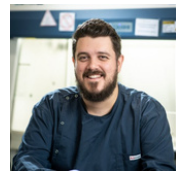
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### Projects B1.3 and B1.4

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### Project C1.1

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### Project C1.2

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## Industry Advisory Group

### Queensland

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### New South Wales

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### Northern Territory

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