



# SCIENTIFIC EXCHANGE Final Report

**Dr Karen Kirkby**  
Cotton Pathologist  
NSW DPI  
Narrabri  
NSW, 2390

## ***PART 1 - SUMMARY DETAILS***

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Cotton Catchment Communities CRC Project Number:

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**PROJECT TITLE: TRAVEL TO BELTWIDE CONFERENCE,  
ORLANDO, FLORIDA**

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Project Commencement Date: 2/1/12

Project Completion Date: 10/1/12

Research Program: Diseases of Cotton X

## ***PART 2 – CONTACT DETAILS***

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**Administrator: Andrew Watson**

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**Principal Researcher: Dr Karen Kirkby**

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**Researcher 2:**

**Organisation:**

**Postal Address:**

**Ph:**

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Other Staff & Collaborators – Please list

Signature of Research Provider Representative:

### ***PART 3 - TRAVEL REPORT***

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**NAME OF OFFICER:** Karen Kirkby

**POSITION:** Project Officer

**LOCATION:** ACRI, Narrabri

**SOURCE:** CF

**PURPOSE OF TRAVEL:** Travel to USA to present a paper at the Beltwide Cotton Conference. Leading experts will be attending this conference and my attendance will enhance my knowledge of cotton diseases and their control, whilst facilitating my ability to network with scientists on an international scale.

**COUNTRY TO BE VISITED:** USA

**NAMES OF OTHER OFFICERS TRAVELLING:** None

**DATES & DESTINATIONS OF OFFICIAL VISITS IN THE LAST 2 YEARS:**  
Texas, USA 16<sup>th</sup> July to 8<sup>th</sup> August 2011

**PROPOSED DATE OF DEPARTURE:** 1st Jan 2012 **RETURN:** 8<sup>th</sup> Jan 2012

**ESTIMATE OF COST:** \$6728 (EXCLUDING SALARY)

**FUNDING BODY:** CRDC

**COST TO BE MET BY DEPARTMENT:** SALARY + ON-COSTS ONLY

## **Objectives of the proposed visit**

Ms Karen Kirkby will travel to USA to:

- Present a paper at the Beltwide Cotton Conference titled “An Update on Verticillium Wilt of Australia”
- Participate in the workshop “Cotton Disease Identification and Problems”
- Meet and discuss potential areas of collaboration with colleagues working with cotton diseases overseas

## **Benefits**

Being newly appointed as Cotton Pathologist for NSW Primary Industries, this is an important opportunity for Ms Kirkby to be introduced to, and network with, the international cotton community. Attending this conference will allow Ms Kirkby to have the results of her work program in cotton peer reviewed at an international level and increase her experience at presenting before an international audience. Exposure to current science at this level will increase her knowledge and awareness of cotton diseases and current management practices employed overseas. The theme covered by the conference is of particular interest, with both workshops and seminars targeting cotton diseases. Information presented at the conference by other leading scientists may be highly relevant to the objectives of the research carried out by NSW Primary Industries and Ms Kirkby will use this information to continue to evaluate IDM strategies for the control of black root rot. Attendance will help to foster potential future collaborative relationships and contribute to the current projects.

## **Background:**

**Cotton Industry:** The annual value of cotton lint production in Australia has averaged more than \$650 million over the last 6 years, and currently 65% of the industry is based in NSW. The strong commitment of NSW Primary Industries to the cotton industry is best demonstrated by the Department’s agreed role as lead agency for the Cotton sector within the National (PISC) Framework for Research, Development and Extension and as a core participant in the CCC CRC. Developing effective disease management strategies is identified as a high priority for the cotton industry. NSW Primary Industries has been a primary provider of pathology R&D to the cotton industry and is well recognised for its strength and achievements in this area.

**Officer:** Karen Kirkby, newly appointed cotton pathologist for NSW Primary Industries. Karen has recently submitted her PhD and is keen to enhance her career in plant disease diagnosis. Ms Kirkby has a genuine interest in the biosecurity of the Australian Cotton Industry.

**Visits to organisations/areas:** During her time in the USA, Ms Kirkby will travel to the Beltwide Cotton Conference held in Orlando, Florida.

**Attendance at meetings:** Cotton Disease Council Workshop

### **Anticipated benefits:**

- Travelling to this conference will allow Ms Kirkby to gain further experience at presenting to an international audience and facilitate meeting other scientists from overseas with experience in the field of cotton diseases. This provides benefit to the cotton industry by increasing Ms Kirkby's knowledge of current diseases of cotton in Australia and potential exotic pathogens and management strategies.
- Newly appointed cotton pathologist Ms Kirkby, will increase her knowledge of cotton diseases both present and absent from Australian crops. Ms Kirkby will contribute in international discussions on the control of important pathogens. Interacting with leading scientists in the diseases of cotton field will enhance Ms Kirkby's professional career.
- Confer/collaborate with International experts for diseases of cotton. This will raise the profile of Ms Kirkby, of NSW Primary Industries and is likely to lead to Ms Kirkby being part of on-going collaborative research with these teams.
- The biosecurity profile of Ms Kirkby, ACRI and NSW Primary Industries will be enhanced with the cotton industry. This will be of benefit in attracting external funding in future.
- Knowledge gained from Ms Kirkby's attendance at this conference will benefit NSW Primary Industries through delivery of the latest information on disease management strategies, current trends and potential threats to the Australian cotton growing community.

### **Itinerary**

Date	Activity
2/1/2012	Narrabri – Sydney – San Francisco - Orlando
3/1/2012 to 6/1/2012	Beltwide Cotton Conference
8/1/2012	Orlando – Los Angeles – Sydney - Narrabri

### **Highlights of the 2012 Beltwide Cotton Conference**

- Presentation of paper entitled “An Update on Verticillium Wilt of Australia” to the 72<sup>nd</sup> Annual Disease Council.
- Participation in two days of presentations devoted to cotton pathology including papers on Seed treatments, Verticillium Wilt, Bacterial Blight, Black root rot and Fusarium.

### **Contacts renewed and/or introduced to me by Dr Stephen Allen:**

- Dr Terry Kirkpatrick (University of Arkansas)
- Dr Craig Rothrock (University of Arkansas)
- Dr John Mueller (Clemson University, South Carolina)
- Dr Terry Wheeler (Texas AgriLife, Lubbock, Texas)
- Dr Jason Woodward (Texas AgriLife, Lubbock, Texas)

- Dr Bob Stipanovic (USDA-ARS, College Station, Texas)
- Dr Al Bell (USDA-ARS, College Station, Texas)
- Dr Gino Medrano (USDA-ARS, College Station, Texas)

### Financial Summary:

Item	Budget Estimate	Actual Expenses
Fares – Economy class (international and domestic)	\$4148.54	\$4361.48
Accommodation (based on estimate of actual cost)	\$1400.00	\$1385.04
Sustenance	\$1050	\$361.71
Internal travel costs	\$0	\$222.12
Conference registration	\$130.00	\$130.00
Other (internet charges, fees)	\$0	\$35.30
<b>Total cost</b>	<b>\$6728.54</b>	<b>\$6365.65</b>

**Funding:** CRDC Scholarship \$1800 + \$2000 (New Grant), CRDC Project funds from Diseases of Cotton X (SAP Number 3661-1) \$2565.65.

### Recommendations

The Beltwide Cotton Conference provides an opportunity to revue current research projects in cotton pathology by leading international scientists. Regular attendance at these conferences every couple of years would be advantageous.

### Attendance at the Beltwide Cotton Conference 2012

The Beltwide Cotton Conferences are held annually, this year being held at Orlando, Florida during the 3<sup>rd</sup> to 6<sup>th</sup> January. The future of the Beltwide Cotton Conference is unknown at this stage due to decreasing and unpredictable grower attendance. The current format will be the same (Production and Technical Conferences) for 2012 in San Antonio; however in 2013 the conference at New Orleans there will consist only of Technical Conferences.

I presented a paper (copy attached) entitled “An Update on Verticillium Wilt of Australia: Karen A. Kirkby<sup>1</sup>, Stephen J. Allen<sup>2</sup> and Peter A. Lonergan<sup>1</sup>. <sup>1</sup>NSW Primary Industries, Narrabri, NSW, Australia, <sup>2</sup>Cotton Seed Distributors Ltd, Narrabri, Australia” to the Cotton Disease Council on Thursday 5<sup>th</sup> January. I also attended many presentations (schedule of events following the presented paper). Some highlight presentations included:

## Seed Treatments

- Overview of the Commercial Seed Treatment Process: K. Stair and Charles T. Graham, Bayer CropScience, Grenada, MS. Syngenta Seed Care Technical Update: Scott Martin, Syngenta Crop Protection, Inc., Ruston, LA. Early Season
- Plant Protection Options from Bayer CropScience: Charles T Graham, Bayer CropScience, Grenada, MS.
- Early Season Plant Protection Options from Monsanto: D. Wilson, Monsanto Company, St. Louis, MO.

## Bacterial Blight

- The Resurgence of Bacterial Blight on Cotton in Arkansas: C. S Rothrock<sup>1</sup>, T. L. Kirkpatrick<sup>2</sup>, Tom Barber<sup>3</sup>, C. M Coker<sup>4</sup> and S. E. Smith<sup>1</sup>. <sup>1</sup>Department of Plant Pathology, University of Arkansas, <sup>2</sup>University of Arkansas, Hope, AR, <sup>3</sup>U of A Division of Agriculture, Little Rock, AR, <sup>4</sup>U of A Division of Agriculture, Monticello, AR.
- Isolation of *Xanthomonas campestris* Pv. *malvacearum* From Symptomatic Cotton Bolls: Jason E. Woodward<sup>1</sup>, Ellen B. Ryan<sup>1</sup>, Rebecca A. Grubbs<sup>1</sup>, Mark S. Kelley<sup>2</sup> and Marvin D. Dunlap<sup>3</sup>. <sup>1</sup>Texas Tech University, Lubbock, Texas, <sup>2</sup>Texas AgriLife Extension Service, Lubbock, Texas, <sup>3</sup>Texas AgriLife Extension Service, Wellington, Texas.

## Black root rot

- A protocol for isolating and enumerating *Thielaviopsis basicola* from cotton roots: Applications to LONREN Stunt: Alois A. Bell. USDA-ARS Southern Plains Agricultural Research Center, College Station, Texas.

## Fusarium

- Fusarium Race 4 in the San Joaquin Valley: An Update: Robert B. Hutmacher<sup>1</sup>, CA, S. D. Wright<sup>2</sup>, R. Michael Davis<sup>3</sup>, Davis, <sup>4</sup>CA, Mark Keeley, Shafter, CA<sup>5</sup> and Gerardo Banuelos<sup>5</sup>: <sup>1</sup>University of California - Davis & West Side REC, Five Points, CA, Mauricio Ulloa, USDA-ARS, WICSRU, Shafter, <sup>2</sup>University of California, Tulare, CA, <sup>3</sup>University of California, Dept. of Plant Pathology, <sup>4</sup>University of California Dept Plant Sciences, <sup>5</sup>University of California Cooperative Extension, Tulare County, Tulare, CA.

## Relevance or possible impact on the Australian Cotton Industry

Bacterial blight was reported as being widespread in Arkansas and Mississippi. This had implications for researchers and industry representatives presenting findings at the conference. Presentations commenced with disclosures and disclaimers on lawyers advice. Widespread screening of bacterial blight was until last season no longer a priority. In light of the latest outbreaks, this comes as a reminder that the cotton industry must do all it can to continue to screen for diseases that have the potential to cause major economical losses and threaten the long term sustainability of the industry.

An objective of Diseases of Cotton X is to re-establish Australia's capacity to screen for Hypervirulent bacterial blight. The differential cotton cultivars needed to do this have been located within the USA and we are in the process of having the seed lines imported into Australia where they will be grown in an Aqis Facility. Seed from these plants will then be sent to ACRI. The differential lines will be stored in 2 separate locations for future screening.

Dr Al Bell presented findings about a new and improved selective media for isolating and enumerating *Thielaviopsis basicola* (pathogen causing black root rot in cotton). The new method may be of benefit for researchers in Australia who are studying this pathogen. Future work will include testing this method for its suitability on Australian strains of *T. basicola*.

### **Method of disseminating knowledge gained with other people in the cotton industry**

- Discussion with growers, meetings and field days.
- Paper published in Conference Proceedings
- A copy of the Proceedings in my office will be available for lending
- Discussion with extension personal

### **Executive Summary**

The scientific exchange provided the opportunity for me to travel to the Beltwide Cotton Conference in Orlando, Florida in January 2012. Attending the conference increased my knowledge of cotton diseases present and absent in Australia and the management strategies currently being used. I also gained further experience of presenting to an international audience. Being newly appointed to the position of Cotton pathologist, the opportunity to meet with leading scientists and discuss issues relating to diseases of cotton has helped to enhance my professional career and biosecurity profile.

## **AN UPDATE ON VERTICILLIUM WILT IN AUSTRALIA**

**Karen A. Kirkby and Peter A. Lonergan**

**NSW Primary Industries, Narrabri, NSW, Australia**

**Stephen J. Allen**

**Cotton Seed Distributors Ltd, Wee Waa, NSW, Australia**

### **Abstract**

Pathologists from the NSW Department of Primary Industries have been monitoring the distribution, incidence and severity of diseases in commercial cotton fields in all the cotton production areas of NSW for 28 consecutive years. Quantitative data has been collected and stored in a disease survey data base that includes the incidence and severity of Verticillium wilt and Black root rot. The increasing incidence of Verticillium wilt associated with the widespread adoption of reduced tillage practices prior to 1990 and the decreasing incidence of the disease following the release of cultivars with resistance to Verticillium wilt in 1990 was reported at the 1997 Beltwide Cotton Conference. Disease survey results since then shows that the incidence of Verticillium wilt is increasing again in the Namoi Valley. Survey results also show that the incidence of black root rot has increased dramatically since 1999.

The recent observation that a high incidence of Verticillium wilt at the end of the season is commonly associated with a high incidence of black root rot early in the season suggests that there may be an interaction between the two pathogens. The control of Verticillium wilt in cotton requires management for earliness while black root rot delays crop maturity. The possible contribution of some tillage and irrigation practices is also discussed.

### **Introduction**

The 2010/2011 cotton season marked the 28<sup>th</sup> consecutive year that bi-annual (early and late season) disease surveys have been conducted on commercial cotton crops (Bourke/Walgett, Macintyre Valley, Gwydir Valley, Namoi Valley, Macquarie Valley, Lachlan Valley and Murrumbidgee Valley) of NSW. Quantitative data on the distribution, incidence and severity of cotton diseases in NSW indicate the impact of the adoption of resistant varieties and other control strategies. Information gathered from these surveys has been compiled into a database that provides an invaluable resource for pathologists. Importantly, the results assist in prioritizing future research efforts, whilst also indicating the impact of farm management practices on disease incidence and severity. Disease survey results from Australia were reported at the 1997 Beltwide Cotton Conference for the season 1995-1996 (Allen & Lonergan, 1997). This paper presents an update on the Verticillium wilt since then.

Disease survey results indicate that the mean incidence of Verticillium wilt and Black root rot caused by the pathogens *Verticillium dahliae* (Kleb.) and *Thielaviopsis basicola* (Berk. and Br.) Ferraris respectively is much higher in the Namoi valley than in any of the other production areas.

## Verticillium Wilt

Allen and Loneragan, (1997, 1998) reported that the incidence of Verticillium wilt had reached a peak in the 1989/90 season when the incidence of the disease in NSW and the Namoi Valley was found to be 16.6% and 31.2% respectively (Table 1). The increasing incidence of Verticillium wilt was associated with the widespread adoption of permanent bed systems and reduced tillage. The release and rapid adoption of high yielding commercial cultivars with resistance to Verticillium wilt resulted in a significant decline in the incidence of the disease over the next 10 years. The mean incidence of Verticillium wilt for NSW and the Namoi Valley in the 1998/99 season were found to be 2.9% and 3.6% respectively. The reduction in wilt incidence in fields in the Namoi Valley where disease incidence was previously very high was outstanding.

Since 1998/99 the incidence of Verticillium has increased (Figure 1). In the 2010/11 season the mean incidence of Verticillium wilt in the Namoi valley was 13.1% compared to 4.1% for all of NSW.

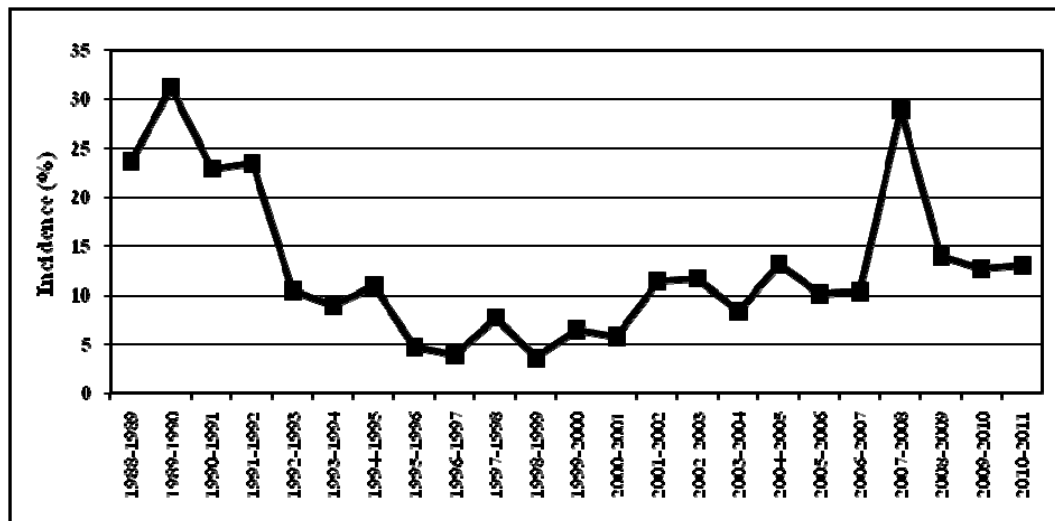


Figure 1. The incidence of Verticillium wilt (%) in commercial cotton fields grown throughout the Namoi Valley region of Australia.

## Black Root Rot

Black root rot in cotton is caused by the soil-borne fungus *Thielaviopsis basicola* (Berk. & Br.) Ferraris. The disease was first recorded in Australian cotton in 1989 (Allen, 1990) and by 2002, Black root rot was established on 97% of cotton farms surveyed in NSW (Nehl et.al 2004). The incidence of Black root rot has risen significantly over the past 10 years (Figure 2). Black root rot is widespread and found in all major cotton growing regions within NSW. The disease was found in all fields that were inspected in the Namoi Valley during the 2010/11 season with a mean incidence of 80% of plants affected.

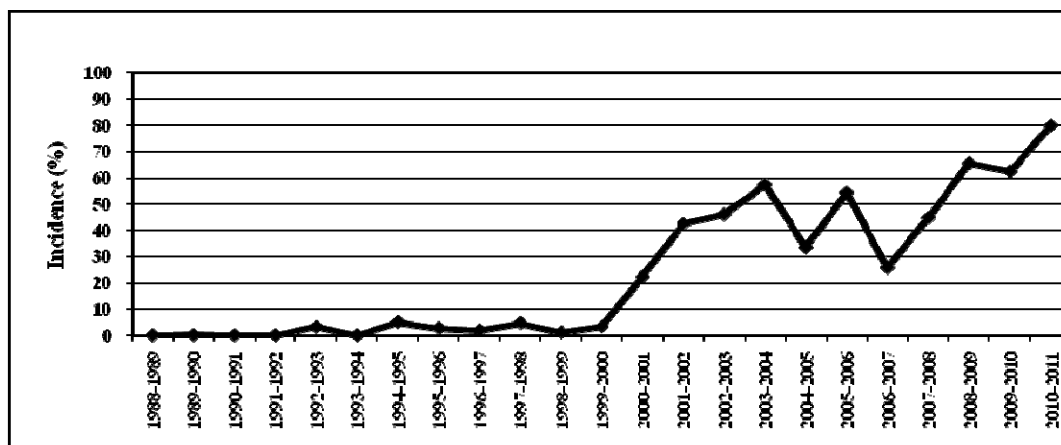


Figure 2. The incidence of Black root rot (%) in the Namoi valley, NSW.

### A Possible Interaction?

Disease surveys early in the season provide an opportunity to assess the incidence of Black root rot. Disease incidence and severity are determined for 200 seedlings in each field surveyed using the step-point method described by Nehl et al., (2004). The incidence of Verticillium wilt is estimated by inspecting 200 plants during the survey at the end of the season just prior to defoliation. Data from field transects are collected at a similar time to the disease surveys. A transect is a set track across a field located by GPS reference to enable repeated assessments along the same track season after season. Ten plants are inspected in every tenth row across the entire field at each assessment.

Results from disease surveys and field transects in commercial cotton fields (Table 1) have shown that a high incidence of Verticillium wilt at the end of the season frequently corresponds with a high incidence of Black root rot early in the season. Data for Table 1 was collected from the Namoi Valley in 2008/09, 2009/2010 and 2010/2011 seasons.

Table 1. Field transect and disease survey results for typical commercial cotton fields in the Namoi Valley during the 2008/09, 2009/10 and 2010/11 seasons showing a high incidence of Verticillium wilt at the end of the season and a high incidence of Black root rot at the beginning of the seasons.

Season	Assessment	Black root rot (%)	Verticillium wilt (%)
2008/09	Field transect	52	49
2008/09	Field transect	100	45
2009/10	Field transect	99	83
2009/10	Disease survey	95	85
2009/10	Disease survey	100	52
2010/11	Disease survey	97	71
2010/11	Disease survey	68	41

Black root rot is most apparent early in the season and can significantly slow down seedling growth. Control strategies for black root rot include delayed planting to avoid cool conditions early in the season and crop management to allow affected plants to ‘catch up’ late in the season (Kirkpatrick & Rothrock, 2001). Verticillium wilt is particularly significant late in the season when it is favoured by cool autumn temperatures. The control of Verticillium wilt requires crop management for earliness (Kirkpatrick & Rothrock, 2001). When a crop is affected by both Black root rot and Verticillium wilt the slow early season growth caused by Black root rot contributes to delayed maturity that exposes the crop to conditions that are more favourable to Verticillium wilt.

This observation raises the question: Does the delayed maturity resulting from the presence of both black root rot and Verticillium wilt result in higher levels of inoculum in the soil and consequently an increasing incidence of Verticillium wilt? Research efforts will focus on this question. It will be necessary to determine the delays in development and maturity and to monitor soil inoculum levels for both diseases and the pathogens that cause them.

### **Other possible explanations?**

Cotton growers in the Namoi Valley, who have changed their irrigation systems from the traditional furrow irrigation system to an overhead lateral move system, have noticed that Verticillium wilt has become more apparent. Observations on the distribution of roots under the two irrigation systems (Figure 3) indicate a proliferation of root development in the top 15cm of the soil profile with overhead irrigation compared to that under furrow irrigation. An irrigation system that encourages root development in that part of the soil profile where inoculum levels are highest could be expected to favour increased disease development.

Disease survey results over the last 15 seasons do confirm a significant increase in the incidence of Verticillium wilt under overhead irrigation. However, removing the few results from fields with overhead irrigation did not remove the trend to increasing incidence of Verticillium wilt.

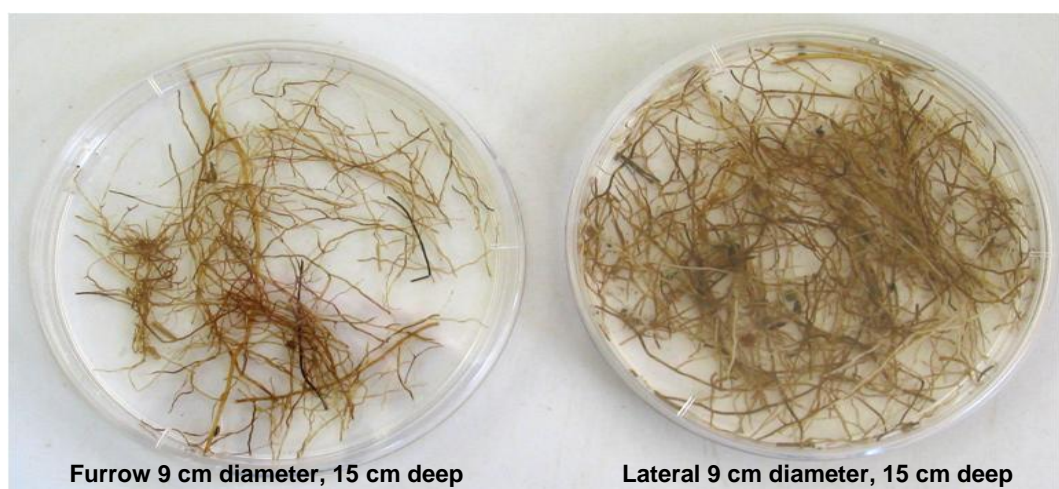


Figure 3. Comparison of root development of cotton plants grown under furrow irrigation (left) and lateral irrigation systems (right).

## Acknowledgements

These studies and surveys have been funded by the Australian Cotton Research and Development Corporation and the Cotton Catchment Communities CRC. We also acknowledge the technical assistance of Bethany Cooper, NSW DPI, Australia.

## References

- Allen, S. J. 1990. *Thielaviopsis basicola*, a new record on cotton in Australia. *Australasian Plant Pathology*, 19, 24- 25.
- Allen, S. J., and Lonergan, P. A. 1997. Diseases of Cotton in NSW - 1995-96 In Proceedings of the Beltwide Cotton Conference (Vol. 1, pp. 90-92): National Cotton Council, Memphis, TN.
- Allen, S. J., and Lonergan, P. A. 1998. Trends in Diseases in Australian Cotton In The Ninth Australian Cotton Conference (pp. 541-547). Gold Coast, QLD: Cotton Research & Development Corporation.
- Kirkpatrick, T. L., and Rothrock, C. S. 2001. Compendium of Cotton Diseases. Minnesota, USA: The American Phytopathological Society.
- Nehl, D. B., Allen, S. J., Mondal, A. H., and Lonergan, P. A. 2004. Black root rot: a pandemic in Australian cotton. *Australasian Plant Pathology*, 33, 87-95.

## Schedule of Events

TUESDAY,		
8:00a – 12:00p	Extension Cotton Specialist Meeting (By Invitation Only)	New York/New Orleans
8:00a – 6:00p	Precision Cotton Researcher's Meeting (By Invitation Only)	Crystal Ballrooms K-L
8:00a – 10:00p	Speaker Practice Room	Palms Registration 2
10:00a – 5:00p	CEU Desk	Palms Registration Desk
10:00a – 5:00p	Confex Presentation Downloading Room	Chicago
10:00a – 5:00p	Conference Registration NCC Membership Desk Cotton Crafts Store Beltwide Concierge Desk - Attraction and Dinner Information	Crystal Ballroom Foyer
10:00a – 5:00p	News Room	Anaheim/Atlanta
12:00p – 1:00p	Consultants Conference Luncheon	Crystal Ballroom J1
1:00p – 6:00p	Consultants Conference General Session	Crystal Ballroom M
3:00p – 6:00p	USDA-ARS Cotton Geneticists Meeting (By Invitation Only)	Crystal Ballrooms D-F
WEDNESDAY,		
6:30a – 7:45a	Cotton Incorporated Media Breakfast (By Invitation Only)	Miami
7:00a – 8:00a	Continental Breakfast	Crystal Ballroom Foyer
7:00a – 10:00p	Speaker Practice Room	Palms Registration 2
7:30a – 5:00p	Conference Registration NCC Membership Desk Beltwide Concierge Desk - Attraction and Dinner Information Internet Café	Crystal Ballroom Foyer
7:30a – 5:00p	CEU Desk	Palms Registration Desk
7:30a – 5:30p	Confex Presentation Downloading Room	Chicago
8:00a – 9:30a	Spouse Hospitality	Tuscany's Restaurant
8:00a – 10:00a	Cotton Production Conference	Crystal Ballrooms G-H
8:00a – 5:00p	Cotton Crafts Store	Crystal Ballroom Foyer
8:00a – 5:00p	News Room	Anaheim/Atlanta
10:00a – 10:30a	Coffee Break	Crystal Ballroom Foyer
10:30a – 12:00p	Conventional Cotton: Back to The Future?	Crystal Ballrooms A-B-C

10:30a – 12:00p	Extension Cotton Specialist Workshop	Crystal Ballrooms N-P-Q
10:30a – 12:00p	Ecological Concepts for Cotton Insect and Crop Management - A Precision Agriculture Approach	Crystal Ballroom F
10:30a – 12:00p	Social Media in Production Agriculture	Crystal Ballroom J1
12:00p – 1:00p	Cotton Grower Beltwide Luncheon (By Invitation Only)	Grand Ballroom 7
12:00p – 6:00p	Cotton Foundation Technical Exhibits and Poster Board Session	Royal/Sabal/Sago
12:15p – 1:15p	Technical Chairpersons Meeting & Lunch	Miami
1:30p – 3:00p	National Cotton Variety Test Program Meeting (By Invitation)	Miami
1:30p – 3:30p	Irrigation Essentials for Cotton	Canary 3-4
1:30p – 3:30p	Tools to Conduct On-Farm Tests	Crystal Ballrooms A-B-C
1:30p – 5:30p	Thrips and Nematode Management: Making the Right Decisions on	Canary 1-2
1:30p – 5:45p	New Developments from Industry	Crystal Ballroom M
1:30p – 6:00p	Cotton Options Workshop	Crystal Ballrooms N-P-Q
2:00p – 4:00p	Coffee Break - Cotton Foundation Technical Exhibits	Royal/Sabal/Sago
3:00p – 4:30p	Bayer Crop Science/Ed Keane (By Invitation Only)	St. Louis
3:30p – 4:00p	Coffee Break	Crystal Ballroom Foyer
4:00p – 8:00p	BASF Hospitality Suite (By Invitation Only)	Grand Ballroom 6
5:00p – 6:00p	RBTN Group and Cotton Germplasm Committee Meeting	Crystal Ballrooms D-E
6:30p – 9:30p	Cotton Specialist of the Year Banquet (By Invitation Only)	Shark's Underwater Grill, SeaWorld Orlando
<b>THURSDAY,</b>		
6:30a – 8:00a	Farm Press/Cotton Foundation High Cotton Awards Breakfast (By Invitation Only)	Crystal Ballroom G1
7:00a – 10:00p	Speaker Practice Room	Palms Registration 2
7:30a – 5:00p	Conference Registration NCC Membership Desk Beltwide Concierge Desk - Attraction and Dinner Information Internet Café	Crystal Ballroom Foyer
7:30a – 5:00p	CEU Desk	Palms Registration Desk
7:30a – 5:30p	Confex Presentation Downloading Room	Chicago
8:00a – 9:30a	Spouse Hospitality	Tuscany's Restaurant
8:00a – 10:00a	Enhanced Efficiency Nitrogen Fertilizers	Crystal Ballroom H
8:00a – 10:00a	Ecological Concepts for Cotton Insect and Crop Management - A Precision Agriculture Approach	Crystal Ballroom F
8:00a – 10:00a	Management of Nematodes in Cotton Using Site-Specific	Crystal Ballrooms K-L
8:00a – 10:00a	Glyphosate-Resistant Weed Control Systems: Managing Around the	Canary 1 & 2
8:00a – 10:00a	Cotton Insect Research and Control Roundtable	Crystal Ballrooms N-P
8:00a – 5:00p	News Room	Anaheim/Atlanta
8:00a – 5:00p	Cotton Crafts Store	Crystal Ballroom Foyer
9:00a – 5:00p	Confex Presentation Downloading Room	Chicago
10:00a – 10:30a	Coffee Break	Crystal Ballroom Foyer
10:00a – 11:00a	Coffee Break – Exhibits	Royal/Sabal/Sago
10:00a – 4:00p	Cotton Foundation Technical Exhibits	Royal/Sabal/Sago
10:00a – 10:00p	Poster Board Session	Royal
10:30a – 12:00p	Cotton Economic Outlook Symposium	Canary 3 & 4
10:30a – 12:00p	Partitioning and Translocation in Relation to Efficient Production and	Crystal Ballroom J1
10:30a – 12:00p	Cotton Utilization Conference: A Life Cycle Approach	Crystal Ballrooms A-B
10:30a – 12:20p	The Trouble with Leaf Spots and Cotton: Opportunities for Management	Crystal Ballrooms K-L
10:30a – 6:00p	Cotton Improvement Conference	Crystal Ballroom C

1:30p – 5:30p	Cotton Utilization: Fabric Chemistry, Nonwovens, & Products Symposium	Washington
1:30p – 5:30p	Cotton Engineering-Systems Conference	Crystal Ballrooms A–B
1:30p – 5:30p	Cotton Quality Measurements	Miami
1:30p – 5:30p	Cotton Disease Council	Crystal Ballrooms K–L
1:30p – 5:30p	Cotton Economics and Marketing Conference	Canary 4
1:30p – 5:30p	Cotton Insect Research & Control Conference – Session B	Crystal Ballrooms N-P
1:30p – 5:30p	Cotton Agronomy & Physiology Conference - Session A	Crystal Ballroom J1
1:30p – 6:00p	Cotton Soil Management & Plant Nutrition Conference	Crystal Ballroom H
1:30p – 6:30p	Cotton Insect Research & Control Conference - Session A	Crystal Ballroom M
1:30p – 6:00p	Cotton Ginning Conference	Crystal Ballrooms D-E
1:30p – 6:30p	Cotton Weed Science Research Conference	Canary 1 - 2
2:00p – 3:30p	Cotton Research & Promotion Press Conference (By Invitation)	New Orleans
2:00p – 6:00p	Cotton Agronomy & Physiology Conference - Session B	Crystal Ballroom G1
3:15p – 4:00p	Coffee Break, Inside Poster Board Session	Royal
5:00p – 6:00p	Journal of Cotton Science Editorial Board	St. Louis
5:30p – 6:15p	Cotton Industry Support Group	Crystal Ballrooms D-E
6:30p – 9:00p	Joint Cotton Breeding Committee	San Francisco
<b>FRIDAY,</b>		
7:00a – 3:00p	Speaker Practice Room	Palms Registration 2
7:30a – 12:00p	CEU Desk	Palms Registration Desk
7:30a – 12:00p	Confex Presentation Downloading Room	Chicago
7:30a – 12:00p	Conference Registration NCC Membership Desk	Crystal Ballroom Foyer
7:30a – 1:00p	Beltwide Concierge Desk - Attraction and Dinner Information	Crystal Ballroom Foyer
8:00a – 9:30a	Spouse Hospitality	Tuscany's Restaurant
8:00a – 10:00a	Cotton Quality Measurements	Miami
8:00a – 10:00a	Cotton Ginning Conference	Crystal Ballrooms D-E
8:00a – 10:00a	Cotton Economics and Marketing Conference	Canary 4
8:00a – 10:00a	Cotton Insect Research & Control Conference – Session B	Crystal Ballrooms N-P
8:00a – 11:00a	Cotton Engineering-Systems Conference	Crystal Ballrooms A-B
8:00a – 11:45a	Cotton Weed Science Research Conference	Canary 1 - 2
8:00a – 12:00p	News Room	Anaheim/Atlanta
8:00a – 12:00p	Poster Board Session	Royal
8:00a – 12:00p	Cotton Utilization Conference: Textile Technology Symposium	Washington
8:00a – 12:15p	Cotton Agronomy & Physiology Conference - Session A	Crystal Ballroom J1
8:00a – 1:00p	Cotton Crafts Store	Crystal Ballroom Foyer
8:00a – 1:00p	Cotton Insect Research & Control Conference – Session A	Crystal Ballroom M
8:00a – 2:30p	Cotton Improvement Conference	Crystal Ballroom C
8:15a – 10:00a	Cotton Disease Council	Crystal Ballrooms K-L
8:30a – 11:00a	Cotton Agronomy and Physiology-Session B	Crystal Ballroom G1
10:00a – 10:30a	Coffee Break	Crystal Ballroom Foyer
10:30a – 12:00p	Joint Session: Engineering Systems/Ginning Conference	Crystal Ballrooms D-E