



Australian Government

Cotton Research and  
Development Corporation

## TRAVEL, CONFERENCE or SCIENTIFIC EXCHANGE REPORT 2016

### *Part 1 ..Summary Details*

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*Please use your TAB key to complete Parts 1 & 2.*

CRDC Project Number: CSE 1606

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**Project Title:** The World Cotton Conference 6 -Goiania Brazil 2016

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Project Commencement Date: 30/04/2016 Project Completion Date: 09/05/2016

CRDC Research Program: 4 People

### *Part 2 - Contact Details*

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Signature of Research Provider Representative: \_\_\_\_\_

*U.r.JtJ*

Date Submitted: \_\_\_\_\_

*18/5/2016*

### ***Part 3 - Travel, Conference or Scientific Exchange Report***

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*(Maximum two pages)*

#### **1. A brief description of the purpose of the travel.**

- (a) To present oral and poster presentations (titles given below) at the World cotton research conference where researchers from all over the world present latest findings on cotton farming related topics. The meeting will be an ideal avenue to present our research findings to peers in the field.

##### Presented two talks:

- Does compost addition improve biological functions and microbial diversity in cotton soils? - Gupta, V.V.S.R., Kraker, S.K., Hicks, M., Nidumolu, B. and Weir, D.
- Effect of rotation and environment on fungal communities in Australian cotton soils - Gupta, V.V.S.R., Linda Smith, Karen Kirkby, Linda Scheikowski, Ian Rochester, Nilantha Hulugalle and C.R. Penton

- (b) The meeting will provide an opportunity to directly interact and develop new links or strengthen existing links with experts from around the world.

- Established new linkage with researchers in USA (Dr. Kater Hake, Cotton Inc, USA), Egypt and India.

#### **2. What were the:**

##### **a) major findings and outcomes**

The two talks presented by principal researcher were well received and there were a number of enquiries about the relevance of these findings in cotton fields in other countries. Additionally, the meeting provided a good opportunity for direct interactions with researchers around the world; some are listed below.

- Dr. Kater Hake, Cotton Inc, USA – Cotton microbiome
- Dr. Amal Saber Mohamed, Ag Res Centre, Giza, Egypt – Compost effects on soil biology and nutrition in cotton soils
- Dr. Satyanarayana Rao, UAS, Raichur, India – soil biological functions in organic farming systems
- Dr. G.W. Videla, Bayer Crop Science, Argentina - Plant-microbe interactions in cotton soils

The meeting has provided the principal researcher an appreciation of cotton farming systems in different parts of the world especially in terms of the soil biology and biological functions supported in rain fed and irrigated cotton fields. For example, cotton production systems are in general intensely managed in many countries hence soil biota are exposed to many types of physical and chemical disturbances. Since the introduction of GM cotton varieties, soil biota in Australian cotton cropping systems seem to be less subjected to such disturbances compared to that in countries such as India, Pakistan, Brazil. Thus modern cotton cropping systems in Australia provide a greater opportunity to better harness benefits from biological activities to improve plant health, nutrition and productivity. Additionally, soil borne disease seem to be one of the bottlenecks to cotton production in a number of countries with no immediate plant based solutions that are ready for farmer use, suggesting the need to look for management solutions that manipulate plant-microbe interactions could provide an ideal option as part of an 'Integrated Disease Management' (IDM) strategy. This was also in agreement with the opinion expressed by researchers from other cotton growing countries e.g. USA and India.

##### **b) other highlights**

From the discussions with Dr. Kater Hake, Cotton Inc, USA we recognised the commonalities in soil microbiology in cotton fields in both countries and identified the

need and benefits from a working collaboration. We realised that there is little information on the composition of cotton plant-microbiome and its functional potential.

3. Detail the persons and institutions visited, giving full title, position details, location, duration of visit and purpose of visit to these people/places. (NB:- Please provide full names of institutions, not just acronyms.)

Attended the World Cotton Research Conference 6 only and no other institutions visited.

4. a) Are there any potential areas worth following up as a result of the travel?

In response to the discussions with Dr. Kater Hake, Cotton Inc, USA the following scoping statement for a 'Cotton Microbiome Initiative' to generate foundation knowledge base for cotton plants from four cotton growing countries has been developed which is currently being circulated among active soil microbiology researchers in USA.

*Cotton Microbiome Initiative -identification of unique microbiome members associated with cottonplants*

Background: Plant-microbe interactions are increasingly being recognised for their contribution to productivity and environment health. All plants, and nearly all tissues in a plant are colonised by various types of microorganisms with number of functional benefits already identified. Although soil type and environment effects on microbial diversity and activity are well accepted, plant type can have a significant influence on the composition and activity of microbial communities. Plants are known to shape their rhizosphere and endosphere microbiome by selectively promoting members of soil microbial community. Cotton plant is generally grown in intensely managed systems hence the influence of microbiome on cotton plant health has not been well appreciated. Throughout the modern breeding and varietal development process little emphasis is given, at present, to optimise microbiome composition that promotes cotton plant health. Although such approaches have delivered a number of excellent varieties, these approaches rely on the assumption that plants function as independent organisms based on their genetic code only. However, through interaction with plants, microorganisms have a significant impact either directly or indirectly on 'expression' and/or modification of plant phenotypes and subsequent productivity. Currently we have little in-depth knowledge on the composition and functional potential of microbiome associated with cotton plant.

Proposed work: To characterize the phenotypic and functional composition of cotton plant-microbiome in key cotton growing regions of the world. Genetic composition of the cotton rhizosphere, endosphere and phyllosphere microbiome to be determined using high-throughput amplicon sequencing (16S rRNA-bacteria and ITS region-fungi) and metagenomic tools. Plant samples collected at a specified growth stage(s) (e.g. 8 weeks after germination) to be used for such analysis. Initially, it is proposed that samples from four cotton growing regions i.e. Australia, USA, Brazil and India will be analysed. Efforts to be taken to minimise soil type, cropping system and variety based variation through discussions between researchers from each region.

- b) Any relevance or possible impact on the Australian Cotton Industry?

The proposed collaborative project on 'Cotton Microbiome' will provide foundation knowledge to Australian cotton industry that can assist in the development of cotton varieties

5. How do you intend to share the knowledge you have gained with other people in the cotton industry?

Direct discussions with (i) researchers involved in soil biology research e.g. Oliver Knox, Linda Smith, (ii) members of CRDC (e.g. Susan Maas) and Cotton Australia (e.g. Adam Kay).

6. Please list expenditure incurred. (*Double click inside the table to enter the data*)

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Please email your report by 21June 2016 to: [research@crdc.com.au](mailto:research@crdc.com.au)