

Cotton

RESEARCH & DEVELOPMENT

Final Report

Overseas Travel

**ATTENDED 8TH INTERNATIONAL CONGRESS OF PLANT PATHOLOGY,
CHRISTCHURCH, NEW ZEALAND**

February 2003

Om P Jhorar



NSW Agriculture

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Cotton Research and Development Corporation

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Travel dates: 30th January to 9th February,

Objectives of Travel:

- To attend Rhizoctonia Workshop at Lincoln University, Canterbury, New Zealand
- To participate in 8th international Congress on Plant Pathology
- To keep abreast of recent advances in plant pathology and integrated disease management
- To maintain existing and develop new contacts and collaborations with the international community of plant pathologists.

Itinerary:

30th January, 2003: Narrabri – Sydney – Christchurch

31st January, 2003: Pre-conference workshop at Lincoln University, Canterbury, New Zealand

2nd - 4th February 2003: 8th International Congress of Plant Pathology

5th February 2003: 8th International Congress of Plant Pathology
Australasian Plant Pathology Society Biennial General Meeting.

6th -7th February 2003: 8th International Congress of Plant Pathology.

8th February 2003: Plant Health Australia Workshop: Developing a World Class Plant Pathology Diagnostic Network
Christchurch – Sydney

9th February 2003: Sydney - Narrabri

Executive Summary:

Dr Om P. Jhorar, Plant Pathologist at Narrabri NSW 2390 attended Pre-conference workshop at Lincoln University, Canterbury, New Zealand, 8th International Congress of Plant Pathology, Australasian Plant Pathology Society Biennial General Meeting and Plant Health Australia Workshop “Developing a World Class Plant Pathology Diagnostic Network”

Outcome:

New strategies planned to manage black root rot and other interactive pathogens were developed from the meeting and these will be tested in a new project (submitted to CRDC). These strategies are:

- Initiate trials including Thermal-biodisinfestation of the soil using large volumes of biofumigation crops decomposed under clear polyethylene sheets over a period of three to four weeks to reduce *T. basicola* spore population and study its impact on other seedling diseases.
- Initiate the process of importing the seed of new biofumigating agent that may help reverse the soil borne pathogens of cotton seedling diseases including *T. basicola*.
- Initiate trials on managing black root rot of cotton in accordance to Rhizoctonia, Pythium and Fov.

Outputs:

- One poster presentation.
- Three discussion participation.
- Initiation of new experiments to meet current and future challenges

Recommendations:

Better understanding of biology of pathogen, host, and environment in a given time is essential to develop control strategies. The initiation of study to better understand the nature of *Thielaviopsis basicola* and its interaction with hosts, other soil microbial population and pathogen causing seedling diseases of cotton in Australia is recommended.

Use of novel methods, which include micro-environment modification to promote the host defence mechanism and demote pathogen vigour through environmentally friendly approach that in turn would not only reduce the disease severity but increase the vigour of the crop in a sustainable manner.

Growing sacrificial or seed crops that has detrimental effect on pathogens of high valued commercial crops is a novel method to control soil borne disease. The crops like Mustard and Vetch when incorporated at an appropriate growth stage causes biofumigation effect against *T. basicola*, the causal organism of black root rot of cotton. There are other plants available outside Australia containing high level of ITC that may reduce the pathogen population to a large proportions. It is recommended to try such plants and explore commercial potential of these plants.

The volatile substances that act against the pathogen from biofumigation crops may be lost in atmosphere. Covering the surface with some polymers/ polyethylene sheet covers immediately after incorporation can reduce these losses.

Covers may modify the hydrothermal environment of soil that may help release of volatile substance and enhance the rate of decomposition of the biofumigation crop that in turn would increase the microbial activities in turn may have detrimental impact on the target pathogen.

Black polyethylene sheet covers would absorb heat at the surface level only and increase surface temperature, whereas the clear polyethylene sheet would not only allow the penetration of shortwave radiation including UV components to the deeper layers of the soil but will trap the heat associated with long wave radiation and convective losses too.

It is therefore recommended to explore the possibilities to combine the application of the biofumigation crops and polyethylene sheet mulch to target serious soilborne disease problems like *T. basicola* and *Fov*.

Significant Items:

Rhizoctonia workshop, Lincoln University, Canterbury 8150, New Zealand:

The significant presentations in the workshop were made by researchers of various countries.

Dr. Don Carling Palmer Research Centre, University of Alaska, discussed the application of anastomosis group (AG) concept to *Rhizoctonia solani*. Dr. Stephen Neate, Department of Plant Pathology, North Dakota State University, Fargo, discussed on available tools for efficient isolation including physical, chemical, temporal, nutritional requirements of Rhizoctonia vs. other organisms. Dr. Stephen Neate and Hans Schneider discussed on electrophoretic separation of isozymes and revealed the possibilities of sub grouping of anastomosis groups in zymogram groups. They further discussed the possibility of using such groupings in well defined multinucleate Rhizoctonia as a surrogate for anastomosis test.

Dr. C. Guillemaut of INRA and Dr. Dijon Cedex of ITB, Paris, France, discussed PCR-RFLP method of identification of anastomosis group of *R. solani*. Dr. S. Jabaji-Hare / A. Lees discussed Real-time PCR for diagnostics and presented two case studies where quantitative real-time PCR assays successfully quantified *R. solani* and *Stachybotrys elegans* from infested environment. Other topics included in the workshop were AFLP, microarrays, RT-real-time PCR for gene quantification, Protoplast formation and transformation.

Outcome of the Workshop

- Outcome of the workshop was the initiation of interaction study between *T. Basicola*, *R. Solani* and *Pythium spp.* in the project "Managing Black Root Rot" DAN153C at Australian Cotton Research Institute, Narrabri using the techniques learned in this workshop.

8th International Congress of Plant Pathology:

In the presentations, "Biocontrol in Rhizosphere" Dr. Genevieve Defago of Swiss Federal Institute of Technology, Switzerland, discussed the benefits of crop rotation that would generate competition among the microbial population. He was speculative of the consistent efficacy of deliberate release of microbes as a biocontrol agents.

Dr Chris Gilligan of Cambridge University, United Kingdom, discussed the factors affecting success of biocontrol agents to control the diseases. Dr Gilligan stressed on understanding the underlying dynamics in order to predict the chance of success.

Dr David Weller of USDA, ARS, USA presented his talk on Take-all decline: a model for biocontrol of soil borne pathogens. He suggested that the suppressiveness of Take-all disease soils results from build-up of 2, 4-diacetylphloroglucinol producing fluorescent *Pseudomonas* spp. He further expressed that the suppressiveness of the soil can be measured by locating absence or presence of certain compound in the infested soils.

Dr A.H.C. Van Bruggen suggested that balanced rotations, organic amendments, and reduced tillage can help reduce soil borne disease problems.

Dr Jaacov Katan of Hebrew University of Jerusalem spoke on soil solarisation for integrated management of soil borne plant pathogens. According to Dr Katan, soil solarisation can improve the efficacy of other control methods in a reduced time interval.

Dr Yigel Cohen of Bar-Ilan University, Israel revealed the possibility of use of dry mycelium of *Penicillium chrysogenum* and dry biomass of *Acremonium chrysogenum* against FOV and *Verticillium dahliae* causing wilts of cotton.

The outcome of the congress participation included:

- Initiate the trials including Thermal-biodisinfestation of the soil using large volume of biofumigation crops biomass decomposed under clear polyethylene sheets over a period of three to four weeks to reduce *T. basicola* spore population and study its impact on other seedling diseases.
- Initiate the process of importing the seed of new biofumigating agent that may help reduce the soil borne pathogens of cotton including *T. basicola*.

Workshop On “Developing a World Class Plant Pathology Diagnostic Network”

Plant Health Australia organised a major workshop in conjunction with the 8th International Congress of Plant Pathology in New Zealand on 7th February, 2003, to identify the requirements for maintaining an effective and responsive diagnostic capacity for exotic plant pathogens.

Experts gave half hour presentations, followed by general discussion by participants. The workshop participants agreed to the need for a plant diagnostic accreditation scheme to be established in Australia, and agreed that an accreditation system was needed to support decision making and to ensure good laboratory practice was adopted by all laboratories involved in exotic plant pest identification.

Workshop Recommendations:

It was recommended to develop a cost effective diagnostic network for pests, involving the process to

- (i) Enhance the networking capacity of existing laboratories
- (ii) Identifying centres with specific capabilities, including biosecurity, and securing their national roles/ responsibilities and
- (iii) Establish and introduce an accreditation system for laboratories, and personnel, and develop a series of standardised protocols.

Collaboration:

Collaborative links were established with overseas researchers to study the interaction among pathogens of cotton seedling disease and test new biofumigation plants. Also the existing links were strengthened with the researchers of overseas organisations like ICRISAT

Extension of Results:

The laboratory trials on disease interaction were conducted and the results were shared with the growers in Namoi and Macquarie valleys. These discussions supported the logical decision making by the cotton growers, which reduced not only seedling mortality but precious resources too.

Publications:

Jhorar, O. P. (2003). Using Rotations to Reduce Black Root Rot. The Australian Cotton Grower. 24 (3): 47-48

Jhorar, O. P. (2003). Fighting fungal disease: Biofumigation crops can break the cycle. Agriculture Today. August 2003, Page 6

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