TRAVEL, CONFERENCE or SCIENTIFIC EXCHANGE REPORT 2018

Part 1 - Summary Details

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

CRDC Project Number: **CSP1902**

Project Title: **Attend the 3rd Agriculture and Climate Change Conference 2019 held in Budapest, Hungary**

Project Commencement Date: **15/11/2018** **Project Completion Date:** **27/3/2019**

CRDC Research Program: Choose an item.

Part 2 – Contact Details

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Signature of Research Provider Representative: _____

Date Submitted: _____

Part 3 – Travel, Conference or Scientific Exchange Report

(Maximum two pages)

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

I attended the 3rd Agriculture and Climate Change conference held in Budapest, Hungary from the 24th-26th March 2019. The focus of the conference was on the various challenges of climate change, reduced water availability and approaches to the production of climate resilient crops, which is highly relevant to my current CRDC-supported research CSP 1804: Water use efficiency in a changing climate. Attending this conference provided me an opportunity to present CRDC-supported research on the integrated effects of warmer temperatures and elevated CO_2 on leaf physiology, growth, water use and water use efficiency to the international scientific community. It also provided me an opportunity to engage and network with international scientists researching effects of climate change on a wide range of agricultural systems.

2. What were the:

a) major findings and outcomes

b) other highlights

The Agriculture and Climate Change conference focused on the likely impact of climate change on crop and animal production, and explored approaches to maintain and increase crop productivity in a changing climate. Approximately 230 delegates attended the conference, thus there were numerous seminars, posters and discussion on climate change research in a diverse range of crops.

The themes for the sessions included: Modelling climate change and its application to agriculture; climate change and increased agricultural uncertainty; effects of CO_2 on plant growth; food security in developing countries; abiotic stress; impacts of climate change on nutrition, quality and resource use efficiency; improving the efficiency of the food chain; plant-microbe interactions and climate change; reducing the impact of agriculture on climate change; innovative breeding practices; and new crops for a new climate.

One of the highlights of the conference was being exposed to the climate change research that is being conducted in a wide range of crops, including coffee, quinoa, and tomatoes, rice and perennial ryegrass. Miroslava Rakocevic (University of Campinas, Brazil) presented the results from a long-term FACE (Free Air Carbon Enrichment) study on the effect of CO_2 and drought on the reproductive structures of Arabic coffee. This research indicated that the number of flower buds may be increased with elevated CO_2. Jacques Berner (North West University, South Africa) presented research on using Open Top Chambers to investigate the combined effects of drought stress and O_3 (ozone) on quinoa grown under elevated CO_2. Maria Rigano (University of Naples Frederico II, Italy) presented research on the effects of high temperatures and the application of biostimulants on the fruit quality and yield of different genotypes of tomato. Hui-Fen Kuo (Agricultural Biotechnology Research Center, Taiwan) presented research investigating the impact of elevated CO2 on phosphorus metabolism and grain phytate content in rice, which may be used to provide a molecular basis for marker-assisted breeding of rice cultivars. Ruchika Perera (University of Melbourne, Australia) presented research on the impact of consecutive heat and drought stress treatments on photosynthesis of perennial ryegrass, which was interesting because the research was a similar study to our research that we published in Functional Plant Biology in 2017 (Warming alters the positive impact of elevated CO_2 concentration on cotton growth and physiology during water deficit). It was really interesting to see the results from studies on such a variety of plant species and their response to altered environmental conditions.

Some of the research that was presented by researchers from the University of Chicago, USA, included use of the Global Gridded Crop Model Intercomparison (GGCMI). James Franke presented research assess the response of crop yields to changes in temperature, carbon dioxide and nitrogen. Their findings showed that shifts in temperature appear to strongly reduce the yield benefit of fertiliser application in current high agricultural production regions

in the US. Another researcher at the University of Chicago, Jonas Jagermeyr, modelled the repercussions of food security in times of conflict. This study also used GGCMI to investigate the impact of nuclear conflict in generating severe climate change. Their simulations suggested that reduced incoming solar radiation would lead to a global decline in temperature and precipitation, and thus, the indirect consequences of nuclear conflict would affect a greater number of people than just the number directly affected by nuclear blasts at the time of conflict.

It was also really interesting to gain a better understanding around some of the research that is being conducted around the effects of climate change on livestock. Rachelle Meyer (University of Melbourne, Australia) presented results from simulations that quantify the impact of heat stress on milk production in eastern Australia to inform climate change adaptation of the diary sector. I also had discussions with Shadi Hamadeh (Professor in Animal Physiology, American University of Beirut, Lebanon) and Katharina Diehl (Potsdam University), who are collaborators on projects that investigate policy frameworks around livestock and food security in the West Bekaa region of Lebanon. This is an important issue due to a growing population with different degrees of urbanisation and wealth increasing the demand for livestock products in the Arab region. Another interesting presentation was work presented by Stefanie Christmann (International Center for Agricultural Research in the Dry Areas; ICARDA, Lebanon), that looked at the diversity and abundance of pollinators in Uzbekistan and Morocco. This research found a decline in wild pollinators, but that alternative pollinators may be beneficial in increasing the net income of the farmers and their resilience to climate change.

I presented a poster titled “How do modern and older cotton cultivars perform in a changing climate?” (Figure 1). Our research was well-received by the international scientific community. This was an exciting opportunity to showcase research conducted in the Australian Cotton Industry, and how the cotton industry operates in Australia. There was significant interest from other scientists about the use of our in-field chambers and the experiments that we are conducting utilising the facility. It was also an opportunity to reconnect with some of the scientists that I had met at the 2nd Agriculture and Climate Change conference in 2017 in Sitges, Spain. This was greatly beneficial in terms of networking and establishing international connections specifically working in agricultural climate change research.

Overall, I found that attending the 3rd Agriculture and Climate Change Conference broadened my horizons about the multi-dimensional and complex issues of a changing climate. It challenged my thinking around the broader implications for society, particularly around the distribution of food and food security. It was exciting to reconnect with some of the scientists that I had met at the previous conference and discuss the progress of our work over the past two years, and to realise that international researchers are taking notice of our climate change research in Australia. Through discussions with other researchers, I feel really confident about the direction of our own cotton research here, and the approaches we are taking to explore how a changing climate may impact the Australian cotton industry.

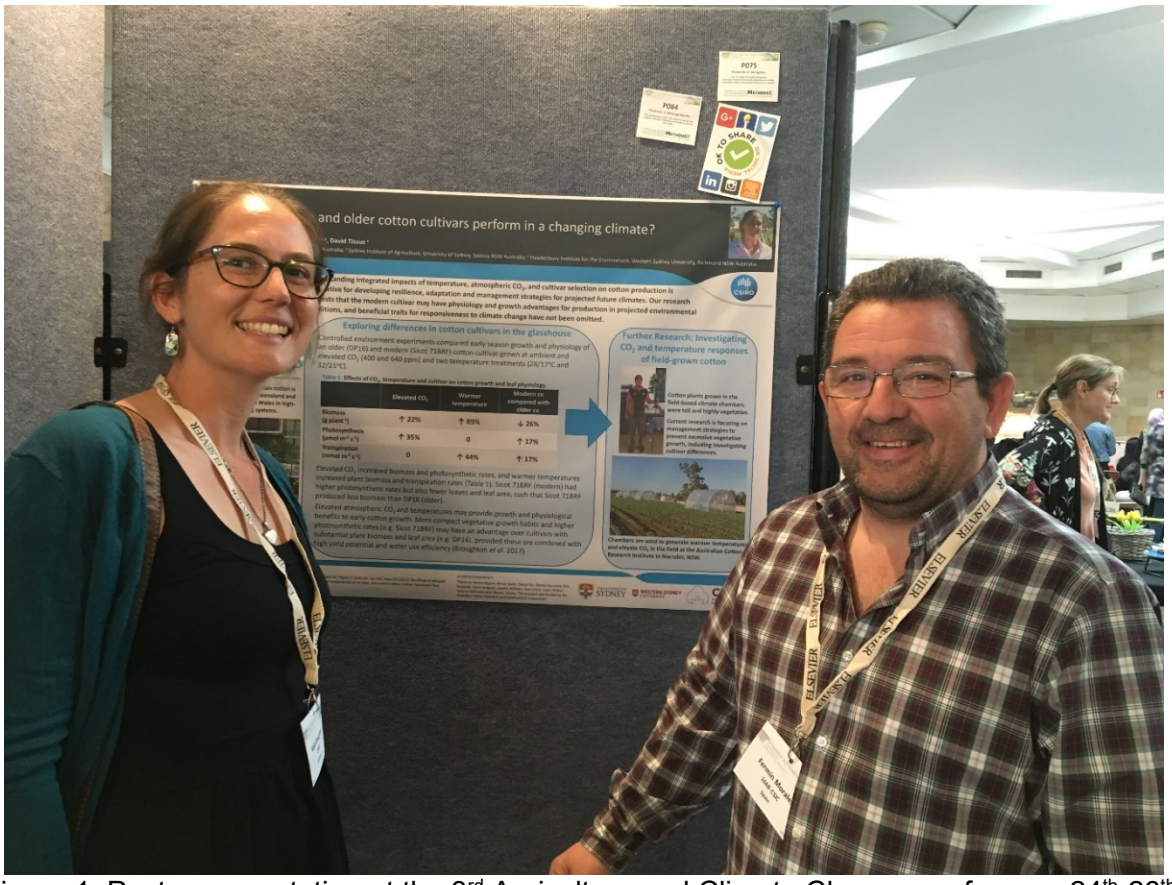

Figure 1: Poster presentation at the 3rd Agriculture and Climate Change conference 24th-26th March 2019 in Budapest, Hungary.

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.)

I attended the third Agriculture and Climate Change conference in Budapest, Hungary, held from the 24th-26th March 2019 (Figure 2). Over the duration of this conference, I used the opportunity to discuss and network with a number of researchers investigating plant responses to altered climatic conditions in a wide range of crops and research areas (e.g. modelling, experimental research, and social research).

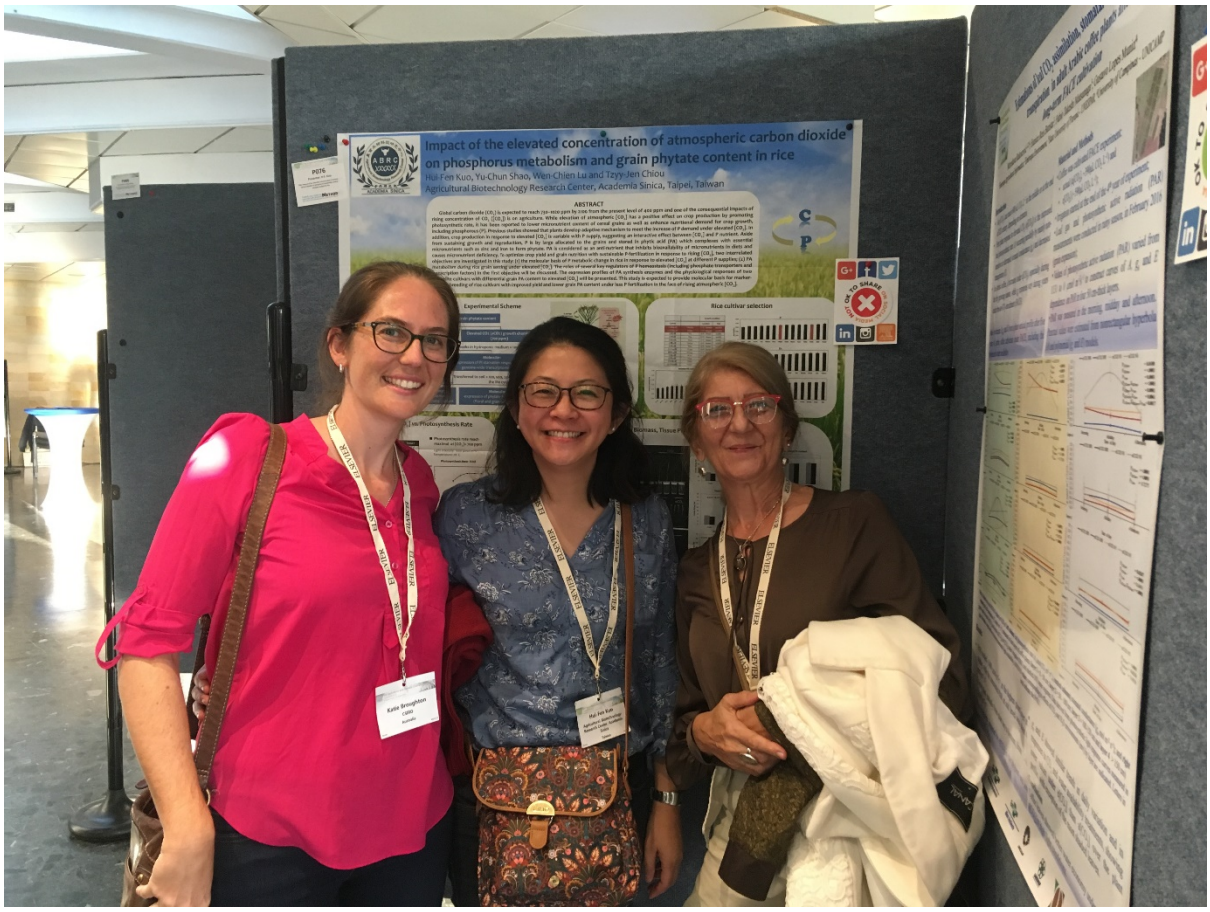

Figure 2: Katie Broughton (left) pictured with Hui-Fen Kuo (centre, Agricultural Biotechnology Research Center, Taiwan) and Miroslava Rakocevic (right, University of Campinas, Brazil) at the Agriculture and Climate Change Conference in Budapest, Hungary.

4. a) Are there any potential areas worth following up as a result of the travel?
b) Any relevance or possible impact on the Australian Cotton Industry?

The conference provided an opportunity to present our climate change research to an international audience, specifically to researchers working in the agriculture and climate change sphere. This was important for peer review of our research on cotton, but also for developing research opportunities and collaboration with other scientists focusing on crop responses to projected climate change. Feedback and discussions suggested that our research was well-received, there was some interest in the Australian Cotton Industry. Furthermore, I have noted research groups that will potentially be relevant to keep an eye on, and papers to follow up on that will assist in literature reviews and comparisons of results in our own journal articles.

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

Details relating specifically to the Agriculture and Climate Change conference will be discussed amongst researchers at ACRI.

Please email your report 30 days after travel/conference to: research@crdc.com.au