

## **2017 OECD CRP Fellowship Summary Report**

**Fellow:** Dr. Christopher Dunlap, USDA-ARS, Peoria, IL, USA

**Title:** Control of soil-borne diseases in peanuts with sustainable practices.

**Location of Fellowship:** University of Southern Queensland, Toowoomba, Australia.

**Host:** Dr Gavin Ash.

**Dates of Fellowship:** 21 October 2017- 16 December 2017.

**Consent:** I give my consent to display this report on the OECD website.

**1. What were the objectives of the research project? Why is the research project important?**

**Objective:** Characterize temporal changes in peanut microbial ecology of samples treated with seed inoculants under Australian production conditions.

The objective was slightly modified to address the microbial ecology of an emerging plant disease in peanuts, peanut kernel shrivel. Peanut kernel shrivel is an undiagnosed condition in peanuts that causes the pods to cease filling normally and fail to reach full size. This research is important because the disease/condition affects an important food crop that provides a low cost protein source. As a legume, the crop is also often used in crop rotation schemes to add nitrogen to the soil without the need for external inputs.

**2. Were the objectives of the fellowship achieved?**

Yes, the objectives were successfully completed. We obtained soil and plant samples for approximately 320 samples from growing regions with and without the Peanut kernel shrivel symptoms present. Samples were chosen to evaluate growing region, plant variety and crop rotation history. Complete environmental DNA was extracted from the samples and prepared for microbiome analysis. Sequencing for both total bacterial and fungal communities was completed. Analysis of the results have just begun and are anticipated to take several months to process the large volume of data.

**3. What were the major achievements of the fellowship?**

Preliminary results have identified a fungus, which its presence is correlated to the existence of disease symptoms. This is an encouraging finding that must be validated before assigning it as the casual agent of Peanut kernel shrivel.

In addition to identifying microbes associated with peanut kernel shrivel, the data will provide a baseline of soil and peanut rhizosphere microbial ecology. This will allow growers and scientists to understand the differences in the microbial communities of different growing regions and plant varieties. The data on the impact of crop rotation history on soil microbial ecology will be valuable in understanding how these practices alter the microbial community.

**4. Will there be any follow-up work?**

Yes, this fellowship provided the opportunity for me develop professional contacts and relationships with Australian agricultural scientists which would have otherwise not been possible. It is anticipated the collaborations fostered under this project will develop into significant long-term interactions between our laboratories and improve the exchange of scientific information between our respective countries. These enhanced interactions should mutually benefit both countries with improved scientific knowledge of agriculture and crop protection technology. It is anticipated the results

of this project will be published in the next 12 months, once all the data analyses are concluded.

**5. How might the results of your research project be important for helping develop regional, national or international agro-food, fisheries or forestry policies and, or practices, or be beneficial for society?**

The project is beneficial to society and policy makers by identifying the causal agent of a disease impacting an important food and rotational crop. This is the first step in managing and mitigating its impact of this plant pathogen on the food system and society.

**6. How was this research relevant to:**

This study supports the Co-operative Research Programme's theme 1 objectives by developing efficient, productive and environmentally sustainable agricultural systems to meet food security challenges of the future. This is accomplished by trying to utilize and work congruously with the natural microbial ecosystem to improved crop protection in peanuts in a sustainable manner. This increased knowledge will be used to guide food and crop production policy in peanut growing regions.

**7. Satisfaction**

I found the fellowship to be professionally and personally engaging. The fellowship allowed myself to develop and strong working relationship with my host and introduced me to a pool of Australian scientists I hadn't previously met. I believe the fellowship will strengthen my scientific career with increased exposure and greater international impact. Logistically and administratively, all interactions with the OECD staff were completed with minimal stress. I would recommend the fellowship to other scientists looking to broaden their horizons.

**8. Advertising the Co-operative Research Programme**

I learned of the program from scientists who have previously participated in the fellowships. I was reminded of the program from various scientific email chains.