Fellowship summary report

Dr. José L. González-Andújar

Title: LONG-TERM DYNAMICS OF WEED BIODIVERSITY-CROP INTERFERENCE UNDER CLIMATE CHANGE

Host Institution: **University of Illinois at Urbana**

Host collaborator: **Dr. Adam S. Davis**

Period: **27 June- 10 September 2017**

I consent to this report being posted in the Co-operative Research Program's website

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

Since the dawn of agriculture, farmers have faced weeds. Competition from weeds is the most important of all biological factors that reduce agriculture crop yield. Losses caused by weeds are attributed to the abundance of one or a few species considered to be the most competitive but a full appreciation of the effect of weeds on crop performance will result from a community-based approach. On the other hand, climatic change is now widely recognized as the major environment problem facing the globe. In this sense, a better knowledge about the effects of climate on the crop-weed relationship is necessary.

The general objective of the fellowship was to understand the effect of climatic variation on long-term crop-weed biodiversity interaction and the trajectory of such effects under climatic change scenarios. Results of this research project will help farmers to weed biodiversity conservation, mitigate the impact of climate change on their crops and help to develop new methods of weed management.

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

Most of the objective of the project has been achieved. We have established a dynamic model of the relationship between weed diversity and crop production, and identified key climate variables. The effect of different climate change scenarios and management strategies are currently being analyzed.

3. **What were the major achievements of the fellowship? (up to three)**

The fellowship was productive and successful, and the following achievements were obtained.

(i) Establishment of databases suitable for further research projects.

(ii) Development and parameterization of dynamic models of the relationship between weed diversity and crop production. The parameterization of the models was performed according to data obtained from long-term experiments.

(iii) Identification of the key climatic variables affecting the crop-weed diversity interference in cereal crops

4. Will there be any follow-up work?

We expect two international publications can be envisaged based in the visit. We are currently preparing a manuscript focus on the results of the influence of climate variables on the crop-weed diversity relationship. We hope to publish the paper during the first semester of next year. The second publication will be based on the effect of climatic change scenarios and management approaches for mitigation. The collaboration is expected to continue in the future to explore different facets of the weed diversity-crop production relationship.

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 would have a socio-economic dimension since the knowledge of the climatic factors influencing the crop-wed diversity interference is of paramount importance for conservation of farmland biodiversity and sustainable crop production in a changing

climate context in line with the priorities of the European Common Agriculture Policy (CAP) and the USDA's Climate Change Adaptation Plan. This research will strengthen the scientific knowledge required by agricultural producers and policy makers to assess the influence of climate change and weeds on crop yield and make decisions on how to mitigate theirs influence.

6. **How was this research relevant to:** The objects of the CRP? The CRP research theme?

This research will strengthen the scientific knowledge to provide support future policy decisions related to the sustainability of the agriculture in relation with the climate change and is relevant to themes I) "MANAGING NATURAL CAPITAL FOR THE FUTURE" and II) "MANAGING RISKS IN A CONNECTED WORLD". The intensive management of the agriculture puts pressures on farmland biodiversity, threaten the agro-systems functionality. In this sense, the understanding crop-weed relationship can help to maintain the weed diversity and associated ecosystem services (e.g. food for pollinators). On the other hand, climate change may lead to the emergence of new crop management scenarios and associated weed communities. The simulation of potential scenarios can help mitigate the associated risks to yield in a changing climate.

7. SATISFACTION

I am very satisfied with the program. The fellowship met my expectations fully and gave me the opportunity to consolidate my collaboration with Dr. Adam S. Davis and continue it in the future. I also had the opportunity to meet other researchers working in the same area, leading to the possibility to explore new scientific links. Without doubt the experience working with a top scientist like Dr. Davis has enriched the further development of my research lines and fertilized my head with new ideas. I would like to thank the OECD staff for their help and administrative efficiency. I believe to increase up to one year could enhance the fellowship potential and also should be positive to bring one's family.

8. ADVERTISING THE CO-OPERATIVE RESEARCH PROGRAMME

I heard about the Co-operative Research Program from other colleagues who had previously benefited from this fellowship. I think the Program should be more extensively advertised throughout different media.