FELLOWSHIP SUMMARY REPORTS

Ágnes M. Móricz

Theme: MANAGING RISKS IN A CONNECTED WORLD (Theme II)

Subject: Fast identification and valorisation of young shoots of invasive *Solidago* species

The host collaborator: Prof. Dr. Gertrud E. Morlock, Justus-Liebig-University of Giessen, Institute of Nutritional Science, Germany

The dates of the fellowship: from 13 March 2017 to 15 May 2017

I consent to post my report or a short paragraph about my fellowship on the Co-operative Research Programme's website.

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

   The aim was the development of a fast, easy to perform and relatively cheap method to distinguish Solidago species (*Solidago virgaurea, S. gigantea, S. canadensis, S. graminifolia* (*Euthamia graminifolia*) and *S. rugosa*) using their young shoots (before reproductive stage) and their valorisation by showing their hidden values; that is, gaining back valuable materials from "garbage" plants whose removal is agreeable or necessary for other reasons. For these purposes the development of layer chromatographic fingerprint analysis and the tracking and identification of their bioactive compounds were planned. The easily available bioactive ingredients from an abundant biomass could result in double profit: environmental and economic.

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

   Based on the young shoot extracts of the five species, only two of them were definitely distinguishable from the others using high-performance thin-layer chromatography (HPTLC) fingerprint. However, the investigation was expanded to the underground parts of the plants and so characteristic, distinctive HPTLC fingerprints were achieved for all five species. Several compounds of the extracts displayed biological activity, such as antibacterial, antioxidant, various enzyme inhibitory and estrogenic. Three of the active components have been identified, the others are being under investigation.

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

   - The development a fast, high-throughput, relatively cheap method to distinguish the five *Solidago* species based on their root or rhizome – so even without aerial part, e.g. from sample collected in winter
   - Compounds inducing different biological activity were found, characterized by high resolution mass spectrometry and three of them have been identified

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

   The fellowship made my collaboration with my host stronger. More common papers are planned to write from the obtained results in the close future and submit journals with impact factor, as well as the start of other common projects are planning.

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?**

   To prevent economic losses, to fight against agricultural and human pathogens and disease agents, and to protect the environment and biodiversity, the European Commission is supporting action on invasive alien species. Regulation 1143/2014 on invasive alien species introduced on 1 January 2015 aims to sustain native biodiversity and ecosystems. In order to protect the native environment, e.g. by controlling certain invasive non-native species, early warning of their appearance and rapid actions (removal of the plants preferably before the reproductive stage) is essential. The quick, relatively cheap and simple identification of the plants using their underground parts enables their removal before flowering and setting seeds. To show that these plants with big biomass can be a source of bioactive compounds, could promote their removal from the environment resulting in the restoration of the native biodiversity.

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

   This work is most relevant to Theme II by focusing on the identification and valorisation of invasive species by showing their significance as a source of bioactive compounds, and not incidentally, to promote their removal from the environment. As invasive plants tend to be fast growing species displacing native ones, they alter the ecological balance as well as the landscapes. Therefore, this proposal could be relevant also to Theme I. These studies resulted in a new fingerprint method to determine the presence of *Solidago* in the selected area. Also several biologically active components have been found and characterized.

7. Satisfaction

I am definitely satisfied with the environment and instrumentation of the host institute as well as the obtained results. I achieved what I planned, so I am very grateful for OECD CRP for the fellowship that exploited my expectations. This fellowship strengthened the bonds between our research groups and promoted by planning further common projects. As well as we plan more publications from the obtained results that will increase my career opportunities.

8. Advertising the Co-operative Research Programme

I learnt about CRP from the director of my institute.