European Network for the durable exploitation of crop protection strategies

IA3 Activity: *Human resource exchange*

ENDURE - Internal Mobility

Final activity report

Establishing the possibilities for estimating the effect of crop rotation history (short term) on a suite of plant and invertebrate target organisms.

1. Information about researcher and sending partner

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Professional status: PhD Student

Sending partner: SZIE, Szent Istvan University

Institute/Department/Research Unit: Plant Protection Institute

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*Supervisor information only for PhD student, post-doc and junior researchers

2. Information about hosting partner

Hosting partner: RRES, Rothamsted Research

Institute/Department/Research Unit: Plant and Invertebrate Ecology

Address: Harpenden Hertfordshire AL5 2JQ

Supervisor name*: David Bohan

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* For senior scientist indicate the name of the collaborating colleague

3. Information about the visit

Duration: 4 months, fragmented into 5 periods:
      2008-11-10 – 2008-11-21
      2009-01-22 – 2009-01-28
      2009-03-23 – 2009-03-27
      2009-09-21 – 2009-10-31
      2010-04-20 – 2010-06-18

Overall starting date: 10 November 2008
Overall ending date: 18 June 2010

4. Description of the activities and outcomes

Background and context:
Weed management and its relation to cropping systems is one of the targeted areas in activities under the ENDURE Project. Both RRES and SZIE have been conducting prior research activities in this field. Therefore, this mobility aimed to benefit from the results of prior activities by exploring their synergistic effects. In a previous analysis at RRES crop sequence was found to explain 60-70% of variance of weed seedbank. Assuming the seedbank is the accumulation of weed plant success in previous years, the issue that arises is whether this important effect exists also for standing weeds.
Collecting data on standing weeds from different regions of Europe provides a basis to broaden the investigation of general patterns of effect of crop sequence on weeds across Europe.

Objective:
Answering these test questions:
1. What is the ecologically relevant duration of a cropping sequence?
2. What are the effects of cropping sequence on standing weeds?
3. Can we find these effects being similar across crops and cropping practices?
In the first period of the mobility it is clarified that the data provided by ENDURE partners (AU, INRA, JKI, RRES, SSSUP, SZIE) were obtained by different sampling methods. Hence, the raised issues (4 and 5) were agreed to be objectives of this mobility:
4. Are there simple and strong relationships between the different metrics used at weed samplings (abundance, cover and biomass)?
5. Are these relationships similar across temporal and spatial scales?

Activities carried out:
Comparison of the main weed sampling methods (abundance, cover and biomass) to assess the feasibility of pooling all data provided by ENDURE partners (AU, INRA, JKI, RRES, SSSUP, SZIE) from different regions of Europe: Fitted linear models showed that the correlations between the different weed metrics were relatively high, and the other possible explanatory variables (e.g. the location of the sampling, the grown crop of the sampled field) were relatively unimportant factors. Therefore, the sampled standing weeds can be analysed in the same way. Consequently, each provided data can be used for answering the above mentioned test questions.

Structure of the crop rotational analysis for the investigation of effect of crop sequence was developed. Datasets provided by ENDURE partners were collected and prepared for joint analysis: the sampling dates were grouped according to the crop phenology, and the sampled weed species were grouped as monocotyledons and dicotyledons. Besides total weed abundance, monocotyledons and dicotyledons were the responses of the fitted models, where the effect of crop sequence was investigated

Preliminary results based on the data that had been available before June 2010 suggested that:
1. three years long crop sequence is the ecologically relevant duration.
2. crop sequence was found to explain 30-40% of variance of standing weed abundance and to be of major importance.

5. Links between visit activity and ENDURE

We were starting to extend initial rotational analyses - being undertaken at RRES - across selected areas in Europe. It is hypothesised that the sequence of crops determines the presence and abundance of plant and invertebrate target organisms. Testing and confirming this expectation will support the work of **RA2.6** (Arable crop rotations SCS). The work will also provide data and results to **RA2.3** (Exploitation of landscape and community ecology). For the analysis the "top ten" major weed species identified in **RA4.5** (Weed biology and management) were also tested. Each used datasets were provided by ENDURE partners.

6. Impact

Added value for the researcher:
Improved knowledge about
- different methods of sampling weeds
- ecological modelling
- mixed linear models
- workdays at an English research institute

Added value for sending partner and hosting partner:
The hosting partner will benefit from ideas shared through preparing datasets provided by ENDURE partners for joint analysis. The sending partner had the chance, through this mobility, to obtain knowledge about mixed linear models for its working groups. Potential scientific paper is a definitively added value for both sending and hosting partners. This mobility also deepened the collaborations between sending and hosting institutes.

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IA3 activity leader

Approved