European Network for the durable exploitation of crop protection strategies

IA3 Activity: *Human resource exchange*

ENDURE - Internal Mobility

Final activity report

(The form has to be filled in and sent to the activity leader – message should be sent to his p.a. federica.piccolo@ibaf.cnr.it – within 15 days after the end of the visit)

Topic of the visit

Participate to ongoing experiments looking at intraguild predation by *Harmonia axyridis* (and looking at the effects of trap cropping to protect oilseed rape against insect pests and basic molecular diagnostics)

1. Information about researcher and sending partner

Name and surname: Sandra Krengel

Professional status: PhD student

Sending partner: Julius Kuehn-Institute (JKI)

Institute/Department/Research Unit: Institute for Strategies and Technology Assessment in Plant Protection

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Supervisor phone number*: +49 (0) 33203 48 312

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

2. Information about hosting partner

Hosting partner: Rothamsted Research

Institute/Department/Research Unit: Plant & Invertebrate Ecology

Address: Harpenden, Hertfordshire, AL5 2JQ

Supervisor name*: Dr. Judith Pell

Supervisor e-mail*: judith.pell@bbsrc.ac.uk

Supervisor phone number*: +44 (0) 1582 763 133 2447

* For senior scientist indicate the name of the collaborating colleague

3. Information about the visit

Starting date: 17.05.2010 Ending date: 06.06.2010
Starting date: 14.06.2010 Ending date: 02.06.2010

Total duration: 6 weeks

4. Description of the activities and outcomes

Background and context:

Inside agroecosystems the interaction between crops, pests and the natural enemy guild is very complex. In particular coccinellids present an important part of the aphidophagous guild, a predator. Beside these predators parasitoids and pathogens are members of this guild. Many relationships exist inside these systems and are still not evaluated well enough in a lot of cases.

In the focus of research all over the world the Harlequin ladybird *Harmonia axyridis* is currently a well investigated species in a lot of different ways. This species is native to Asia and invasive to wide parts of North and South America, Europe and even to South America. It is known as a very polyphagous and very versatile species that displays one or maybe the top predator inside the aphidophagous guild and as a threat for native species inside their new conquered habitats. Not only other coccinellid species are suggested to be affected. Also other predator fractions such as lacewings and hoverflies and even some entomopathogenic fungi are threatened to decrease by intraguild predation of *Harmonia axyridis*.

Harmonia axyridis © Sandra Krengel 2009

Objective:

The objective was to exchange experiences, methods and knowledge regarding the research of functions and relationships inside crop-pest-predator systems, in particular regarding coccinellid-pest-interactions. Special attention was given to the invasive Harlequin ladybird *Harmonia axyridis* inside his aphidophagous guild and other existing intra- and interspecific relationships.

Activities carried out:

- Participating in set up of experiments and ongoing experiments on:
  1) Intraguild predation inside *Harmonia axyridis*, *Chrysoperla carnea* and *Pandora neoaphidis* at *Acyrthosiphum pisum* infested *Vicia faba* plants (Cage approach)
  2) Investigation of olfactory effects of *Borago officinalis* on the potential of aphid parasitoid *Aphidius spp.* to parasitise *Acyrthosiphum pisum* at *Vicia faba* plants (Mini greenhouse approach)
  3) Intraguild predation of *Harmonia axyridis* on C*hrysoperla carnea* in or without presence of *Acyrthosiphum pisum* as additional prey (Petri dish approach)
  4) Intraguild predation inside different larval stages of *Harmonia axyridis* and different larval stages of C*hrysoperla carnea* without presence of any additional prey (Petri dish approach)

Picture source: www.schneckenprofi.de

- Design, set up and implementation of an experiment regarding:
  Intraguild effects of field collected and laboratory reared *Harmonia axyridis* or *Coccinella septemunctata* adults on 2nd or 3rd instar larvae of *Chrysoperla carnea* larvae at two different temperature regimes. Co-operative paper of results possible.

- Participating in field work activities regarding differences in biodiversity at different structured agricultural used sites and field margin habitats (countings and Vortis' insect suction sampling)

- Participating in “Mini-beast safari schools‘ week” by helping 5-8 years old children collecting insects (using nets and electric pooters) to demonstrate the variety of invertebrates of different habitats (grasses, hedges and woodland).

- Visit University of Cambridge, in particular the Department of Genetics who deals with the ecological impacts of the invasive *Harmonia axyridis* on British aphidophagous insects, particularly native coccinellids and the interactions between British coccinellids and their natural enemies (including parasitoid wasps and flies, fungal pathogens, sexually transmitted mites and male-killing bacteria) and the potential for these enemies to regulate *Harmonia axyridis* numbers in Britain.
- Visit of the Centre for Ecology & Hydrology (CEH) at Oxfordshire who deals with the impacts of the Harlequin ladybird *Harmonia axyridis* on native insect species and researches the dynamics of natural enemies of non-native species Species attributes and interactions with environmental factors.

5. Links between visit activity and ENDURE

In first place this mobility was integrated into the ENDURE activity “Building the network”. Within the frame of the “Human resource exchange” (IA3) it was possible to establish contacts between researchers and build up collaborations regarding research activities, methods and objectives.

The research activities at both sites of this mobility serve a better understanding of functions and relationships inside crop-pest-predator systems in particular regarding the coccinellid-pest-interactions at different crops. The “Joint research programme” (RA4) was built up to “improve the basic understanding of the biology of the crop-pest systems”. While regarding the effects of native coccinellid species such as *Coccinella septempunctata* in contrast to invasive species such as *Harmonia axyridis* we try to enlarge our knowledge about pest management by using biocontrol agents.

While improving the knowledge about beneficial systems in crops crop protection systems can be developed that involve the effect of beneficial insects such as coccinellids. This could be supportive to optimize the usage of chemical pest control measures and is one important part of “designing innovative crop protection strategies” (RA2).

6. Impact

Added value for the researcher:

This ENDURE mobility was a great opportunity for me to get a look into activities and objectives of the work of other researchers regarding coccinellids and their functions inside the complex system of crops, pests and predators in particular of the invasive coccinellid species *Harmonia axyridis*. This stay served to enlarge my knowledge about different aspects of coccinellid research and used methods. So, a wider range of reflection of my own research activities, aspects and results became possible. Furthermore the visit was very helpful to found collaborations with a lot of very interested and dedicated english scientists, wich I feel very “fertile” for my research future.

Added value for sending partner and hosting partner:

A basis for collaborations inside different working groups was built up. This maybe will help to enrich the following research activities of both, sending and hosting institution, maybe makes it more efficient in some respects and easier to exchange knowledge and new aspects of research.

All these facts could help to enlarge the existing knowledge about coccinellid actions, interactions and effects. So it was a profitable time for both institutions.

Date of submission:

7/7/2010

endure
diversifying crop protection

Dr. Maurizio Sattin
IA3 activity leader

Approved