



**CABI Europe – Switzerland
Annual Report 2006**



CABI improves
people's lives
worldwide
by providing
information and
applying scientific
expertise to solve
problems in
agriculture and the
environment

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Front cover photo: Tomato growers implement recommended IPM procedures in Kosovo

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staff and students

six PhDs completed in 2006

This year, no fewer than six staff and students at CABI Europe – Switzerland (CABI E-CH) completed their PhDs. This is an exceptional and impressive total. The input of these scientists has provided a valuable leavening to the science of the Centre, and has now contributed significantly to the Centre's publication record.

In January, **René Eschen** defended his thesis, which was supervised by Urs Schaffner (CABI) in collaboration with Prof. Heinz Müller-Schärer of the University of Fribourg, Switzerland. As part of a European Union (EU) research project on the role of interactions between below- and above-ground organisms, René investigated factors that affect successful creation of species-rich grasslands on ex-arable land, and the application of easily degradable carbon sources such as sawdust or sugar to reduce inorganic-nitrogen availability in arable soils to facilitate the desired invasion and establishment of characteristic species of diverse grasslands.

The limited seed rain found in the experimental ex-arable fields but also in adjacent pre-existing species-rich grasslands shows that sowing desired species is necessary to overcome seed limitation. The addition of carbon to the soil reduced the growth of weedy plant species compared with typical grassland plant species. The results suggest that carbon addition is a management method that may facilitate the establishment of plant species typical of diverse grasslands, when these are sown on ex-arable land, by reducing competition from weedy species.

René has now received a grant from the Swiss National Science Foundation (SNSF) for a one-year post-doc at Royal Holloway, University of London starting in early 2007. He will be looking at how the effect of carbon addition on mycorrhizal colonization of plant roots is affected by initial soil conditions.

In March 2006, **Esther Gerber** defended her thesis, which was jointly supervised by Harriet Hinz (CABI) in collaboration with Sven Bacher (University of Bern). She conducted her PhD within the framework of CABI E-CH's biological control programme against garlic mustard, an environmental weed in the eastern and midwestern part of the USA (see p. 16). The project itself was initiated in 1998 by Prof. Bernd Blossey (Cornell University, USA). Six beetle species had been prioritized as potential biological control agents. Esther chose to work on the impact and interactions of three of these: two stem-mining weevils, and one root-mining weevil. The main and final criterion for introduction and field release of a control agent in the invasive range of a target weed is its restricted host range. However, increasing emphasis has recently been placed on evaluating the effectiveness of potential agents in actually reducing the vigour and density of the target, triggered by reports of ineffective agents causing negative indirect ecological effects. Investigating the interactions of biological control agents prior to release is an even less-explored field, despite reports of negative interactions between agents post-release. Esther found that all three weevils negatively affect the growth and seed production of garlic mustard, but that the root miner has the strongest negative effect, and is the only agent also reducing rosette survival. Consequently, the root miner was prioritized as a potential agent, and a petition for field release for North America is currently being prepared. In addition, she found no negative interaction between either the two shoot miners, or the shoot miners and the root miner. Therefore, all three could be released together without negative interactions being expected. The conclusions of Esther's work will now be tested in specifically designed post-release studies, results of which are expected to improve the selection process for weed biocontrol agents in general.

Esther continues working at CABI E-CH after defending her thesis in March 2006. Apart from garlic mustard, she is currently involved in two new biological control programmes, also against Brassicaceae weeds, as well as a study on the ecological impacts of Japanese Knotweed in her home country, Switzerland, and surrounding areas.

highlights



René Eschen



Esther Gerber displays her personalized PhD mortar board



Sandrine Girardoz

In May, **Sandrine Girardoz** successfully defended her PhD thesis 'Mortality factors affecting the invasive moth *Cameraria ohridella* (Lep., Gracillariidae) and factors limiting the impact of native parasitoids' at Imperial College London, under the co-supervision of Drs Marc Kenis (CABI) and Donald Quicke (Imperial). Her work, carried out within the EU 5th Framework project CONTROCAM ('Control of *Cameraria*'), provides the first comprehensive analysis of the different mortality factors affecting the horse-chestnut leaf miner, an invasive moth in Europe. It also investigates why native parasitoids do not control the pest.

Another staff member, **Gitta Grosskopf**, defended her PhD thesis in 2006, at the University of Kiel, Germany. Her studies were on the biology, ecology and host specificity and impact of insects associated with hawkweeds, *Hieracium* spp., particularly in the context of a programme to develop biological control agents for use in New Zealand. The emphasis was put on three species of Diptera associated with *Hieracium* spp. in the subgenus *Pilosella*, i.e. two phytophagous hoverfly species and a gall midge. Based on her studies, five insects have been approved for release in New Zealand, where no native *Hieracium* species occur. Building on this work, the project expanded to explore the potential for use of these agents in Canada and USA where there are approximately 29 native *Hieracium* spp. (see p. 14).



Gitta Grosskopf received her personalized mortar board at Delémont station on her return from the viva in northern Germany

In July 2006, **Franck Muller** from France successfully defended his PhD thesis in the Faculty of Agricultural Sciences at the Georg-August-University, Göttingen in Germany. The thesis is titled 'Ensuring the safety of classical biological control for cabbage seedpod weevil in Canada: assessment of the ecological host range of candidate ectoparasitoids in Europe and clarification of their taxonomic status'. Franck's work was supervised by Ulli Kuhlmann (CABI) in collaboration with Prof. Stefan Vidal, Institute of Plant Protection, University of Göttingen, Germany, Mr Hannes Baur, Natural History Museum, Bern, Switzerland, and Drs Gary Gibson and Peter Mason, both Agriculture & Agri-Food Canada (AAFC), Ottawa. During his four years of research Franck revised the taxonomy of the European species of the genus *Trichomalus* and *Mesopolobus* associated with Ceutorhynchinae hosts and provided illustrated keys to ensure up to date information is available to biological control practitioners. In addition he determined the host specificity of the candidate ectoparasitoids in their native cultivated and non-cultivated habitats. A three-year field survey has been carried out to document the European parasitoid assemblages associated with several Ceutorhynchinae species either already introduced in North America as classical weed biological control agents (*Microplontus edentulus* against scentless chamomile; *Hadroplontus litura* against Canada thistle), proposed for introduction (*Ceutorhynchus turbatus* against hoary cress) or of importance in term of conservation (*Ceutorhynchus typhae* on shepherd's purse). These results are used to estimate potential non-target effects on other Ceutorhynchinae species and implications for classical biological control of cabbage seedpod weevil in Canada.



Franck Muller

Thomas Spiegelberger finished his PhD on conservation of biodiversity in mountain grassland in April. During his PhD, which was jointly supervised by Urs Schaffner (CABI) and Prof. Heinz Müller-Schärer (University of Fribourg), Thomas showed through analysis of vegetation and soil microbial communities that short-term and small-scale fertilization or liming of a subalpine pasture had a continuing effect through an altered vegetational and microbial community more than 70 years after the treatments stopped. Furthermore, he investigated at different spatial scales the impact of land-use changes – from traditionally, extensively grazed mountain pastures towards a more intensive use including fertilization or towards abandonment – and the interaction with the invasive plant *Veratrum album*. At the 1 m² scale, land use did not influence plant species richness, but species richness of intensively grazed pastures at the 1000 m² scale was lower compared with traditionally used pastures, probably due to increased nutrient availability. Looking at ways to reduce this negative impact, he tested how carbon addition might change competitive interactions between plants and increase or at least maintain species richness. Three years of sawdust addition decreased in particular the cover of grasses, a group of plants negatively related to species richness in the investigated mountain grasslands. Thomas continues working at CABI E-CH on the resilience of subalpine pastures including different aspects of plant-microbial interactions during 2006, before taking up a research post at CEMAGREF/Université de Grenoble, France.



An encounter with Thomas Spiegelberger during field work

environmental science prize for Thomas Spiegelberger

In 2006, the University of Fribourg awarded a prize for the best research work in Environmental Sciences for the first time. The jury awarded the prize, endowed with CHF 10,000 to Thomas Spiegelberger for his PhD thesis, described above. The jury emphasized that the results of Thomas' thesis show that the conservation of traditional land-use forms is the key for the conservation for biodiversity on mountain grasslands. By revisiting one of the oldest on-going experiments on mountain grasslands, i.e. the so-called 'Versuchsweide' at the Schynige Platte near Interlaken, Switzerland, Thomas could show that nearly 70 years after a 2–4 year period of liming, the treated plots still significantly differed from control plots in terms of the composition of the vegetation and the soil microbial community as well as soil chemistry. These results provide strong evidence that even short-term disturbances of mountain grasslands may negatively affect ecosystem properties for decades.



Thomas Spiegelberger censusing the vegetation at the Schynige Platte (photo: Priska Ketterer, Lucerne, for the Swiss National Research Programme NRP 48)

prestigious scholarship award for Wade Jenner

PhD student Wade Jenner, in the Agricultural Pest Research section, has been awarded the Natural Sciences and Engineering Research Council of Canada (NSERC) Graduate Scholarship for 2006–2008. His research involves the investigation of a candidate classical biological control agent to combat leek moth in Canada. Wade's primary focus is to measure the agent's host specificity, while also studying how certain factors may affect the outcomes of such experiments.

The Canada Graduate Scholarships are awarded to the highest-calibre scholars who are engaged in master's or doctoral programmes in the natural sciences or engineering. This financial support allows enthusiastic Canadian graduate students to fully concentrate on their studies and to seek out the best research mentors in their chosen fields. This, in turn, facilitates first-rate research by these scholars and ensures a steady source of highly qualified scientists to meet the needs of the growing global knowledge economy. The Canada Graduate Scholarship will help guarantee the continuation of excellent research in Canada and the development of scientific leaders of tomorrow.



Wade Jenner assesses the host range of a potential biological control agent for managing leek moth in Canada