BIOLOGIE DES ORGANISMES ET DES POPULATIONS

M2 bop - 2012-2013
proposition de stage

Encadrement :

Dr. Betty BENREY, Laboratoire d'entomologie évolutive, Université de Neuchâtel, Institut de Biologie, Rue Emile-Argand 11, CH-2009 Neuchâtel, Suisse. betty.benrey@unine.ch

Project Supervisor: J. Gwen SHLICHTA, Post-doctoral Researcher, 041 32 718 31 64, jennifer.shlichta@unine.ch

Titre du stage :

The effect of cyanogenic glycosides on the oviposition (egg-laying) behavior of the bean beetle, *Zabrotes subfaciatus*, and its larval parasitoid, *Stenocorse bruchivora*.

Mots clés :

Tri-trophic, insect ecology, parasitism, chemical ecology, ovipositon, allelochemicals, herbivory, plant defense.

Résumé:

Background :

Secondary plant metabolites can have significant effects on the organisms that feed on plants. It is generally accepted that many of the plant-produced secondary compounds have, at least in part, a defensive function. As a result, the success of an insect herbivore's offspring is highly influenced by the host plant chosen for oviposition by the adult insect. Not only can these plant chemicals significantly affect the oviposition behavior and development of herbivores, they can also influence their natural enemies (Turlings and Benrey 1998).

The lima bean plant, *Phaseolus lunatus*, contains cyanogenic glycosides in both the leaves and the seeds. These compounds have been shown to be toxic to leaf herbivores (Balhorn et al. 2005), and to influence their oviposition behavior (Ballhorn et al. 2006). However, very little is known on the effect of these compounds on seed herbivores, and even less is known on their effect on the parasitoids that attack these seed herbivores.

Objectifs :

1. Determine the oviposition preference of bruchid beetles on beans that differ in the amount of cyanogenic glycosides.
2. Determine the oviposition preference of parasitoids on bruchids raised on beans that differ in the amount of cyanogenic glycosides.
3. Determine the performance of parasitoids reared on bruchid beetles feeding on beans that differ in the amount of cyanogenic glycosides.

Méthodes :

For these experiments we will use artificial seeds and seeds of Lima bean previously collected in the field in Mexico. We will use a combination of behavioral, chemical, and ecological analyses. Oviposition preference experiments will include setting up mating pairs of beetles in cups with beans and measuring egg number, development time, mass, survival, and sex ratios. Parasitoid wasp oviposition experiments will involve allowing parasitoids to parasitize beetles and measuring development time, mass, sex ratios, and adult longevity. Cyanogenic glucosides in the beans will be analyzed using an extraction and separation technique, liquid chromotography, and mass spectroscopy.

Deux références bibliographiques:

Balhorn, D.J. and R. Lieberei (2006). Oviposition choice of Mexican bean beetle(Epilachna varivestis) depends on host plant cyanogenic capacity. *Journal of Chemical Ecology* 32: 1861-1865.

Balhorn, D.J., R. Lieberei and J.U. Ganzhorn (2005). Plant cyanogenesis of *Phaseolus lunatus* and its relevance for herbivore plant interaction: the importance of quantitative data. *Journal of Ecology* 31:1445-

1473.
Turlings, T.C.J. and B. Benrey (1998). Effects of plant metabolites on the behaviour and development of parasitic wasps. *Ecoscience*, 5(3), 321-333.

Techniques mises en œuvre :

- **Insect behavior**: ovipostion preference of beetles and their paraistoids
- **Insect ecology**: performance experiments
- **Chemical ecology**: liquid chromotography, mass spectroscopy

Compétences particulières exigées :

- An interest in research involving plant-insect and tri-trophic interactions.
- Strong organization skills and ability to follow detailed directions.
- Neuchâtel is located in French-speaking Switzerland, however the lab includes a diverse array of researchers from different countries. The common language for communication is English, therefore we expect the applicant to be able to understand and communicate in English proficiently.

A retourner à Loic Bollache (bollache@u-bourgogne.fr) avant le 25 juin.