**Ph.D. at the UMR Agroécologie, INRA Centre de Dijon, France**

Title: Conservation management to enhance weed seed regulation by carabids

As part of the ECOPHYTO targets for reducing herbicides while maintaining weed control, This PhD will examine some of the ecological mechanisms underlying carabid predation of weed seeds and the ensuing regulation of weed populations.

The broad goals of the UMR Agroécologie are to better understand agro-ecological processes so that we can develop sustainable management solutions, which reduce pesticide inputs and support a durable, intensive agriculture. Bohan et al. (2011) demonstrated that seed predatory carabid beetles regulate the seedbank of weed species in-field. This pattern was national in scale and had all the necessary hallmarks of a valid, working « Ecosystem Service ». There are however still big gaps in our understanding of which carabid species regulate which species of weed, how consistent this regulation function is across agro-ecological zones in the EU, and how this regulation function can be best promoted by smart (tailored) management. This Ph.D. will contribute to an EU FACCE ERA-NET C-IPM project, called *BioAWARE*, which seeks to understand “whether a high richness and abundance of species or functional groups (biodiversity) of weed seed predators assures natural weed control, in the long term, by increasing regulation rates and rendering them resilient to the variation in environmental conditions in EU agriculture.”

This PhD will examine part of this conjecture by conducting a large-scale meta-analysis of the literature on the efficacy and robustness of regulation services and agro-ecological managements, at the in-field and landscape scales, necessary to support them. The aim of the meta-analysis will be to identify whether regulation and robustness are intimately linked to the diversity and abundance of service providing organisms, and the spatio-temporal distribution of pests in the field. The PhD will test specific expectations for the carabid beetle-weed seed system in a combination of mesocosm and field experiments (Smith 2007) to manipulate carabid and weed seed abundance and diversity patterns in ways designed to manipulate predation.

Bohan, D.A., Boursault, A., Brooks, D.R. & Petit, S. (2011) National-scale regulation of the weed seedbank by carabid predators. Journal of Applied Ecology, 48, 888–898.

Smith, V.C. (2007) Invertebrate response to weed diversity and spatial management within arable fields. Thesis. University of Reading.

Qualifications

The candidate should have a strong background in Ecology, with a keen interest in ecosystem services of regulation. Expertise in statistical design of experiments and analysis would advantageous, as would demonstrable skills in field-experimental research.

The student’s principal place of work will be at the UMR Agroécologie (INRA Centre de Dijon), but will collaborate closely with Wageningen University in the Netherlands.

Net Salary: about 1400€/month

Contract duration: limited to three years.

Starting date: September or October 2017

Application: CV and motivation letter including two supervisor references should be sent by e-mail directly to David Bohan (supervisor of the PhD, David.Bohan@inra.fr) or Wopke van der Werf (co-supervisor, wopke.vanderwerf@wur.nl ) before the 15th of August 2017.

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