

Honey bee spatial ecotoxicology: spatial relationships between colony dynamics and pesticide use at the farm and landscape scales.

The post-doc will be based at:

Centre d'Études Biologiques de Chizé, CEBC CNRS, 79360, Villiers-en-Bois (www.cebc.cnrs.fr) ; in the Team AGRIPOP (www.agripopchize.fr)

Under the supervision of: Vincent Bretagnolle (Head of the team and Head of the Lab)

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Associated teams and collaborators involved in the project:

Mickaël Henry (UR 406 Abeilles et environnement, INRA Avignon), Axel Decourtye (ACTA), Fabrice Allier (ITSAP-Institut de l'abeille), Aude Barbottin (UMR SAD APT - INRA Grignon), Nadia Michel (LTE ENSAIA – Nancy) and Jean-François Odoux (UE Entomologie INRA Magneraud).

The Centre National de la Recherche Scientifique (CNRS), laboratory of Chizé, France, is recruiting a post-doctoral scientist in honey bee spatial ecotoxicology. Funding for this position is for 2 years (6-month probationary contract renewable for 1.5 yrs). Salary is about 2,200 euros net per month ("salaire net"), and the contract will be established between CNRS and the applicant. The post-doc is expected to start on September 1st, 2013.

Objectives:

- To evaluate, at a landscape scale, the phytosanitary practices and "pressure", using a spatially explicit framework (a large dataset has been collected on c.120 farms of the study site with extremely detailed information on phytosanitary practices for each field)
- To analyse the effects of landscape characteristics and agricultural practices on the dynamics of honey bee colonies in this intensive farming system (6 years of data already collected on 300 hives).
- To assess the sustainability of honey production in these farming systems

The post-doc will develop a spatial ecotoxicological approach to investigate these issues, based on the joint analysis of robust apidological, ecological and agronomic datasets being collected over the past 6 years within the Plaine & Val de Sèvre long term research study area (a 450-km² territory, Poitou-Charentes French region, see <http://www.zaplainevaldesevre.fr/>). Those data constitute the so-called ECOBEE honey bee ecological monitoring scheme, which provides an unprecedented opportunity to understand the relationships between agricultural and beekeeping activities at a landscape scale.

Candidates should possess strong skills in spatial ecology and spatial statistics in order to investigate in a spatially explicit model the links between the use of pesticides and the risks of colony decline or collapse. In particular, the successful candidate will be expected to:

- Develop complex empirical modeling procedures using programming languages (R, Winbugs, INLA etc.)
- Be familiar with advanced modeling technics in spatial ecology, including population dynamics modeling and habitat or resource selection modeling.

- Handle large ecological and geographic information datasets using GIS and other database programs.
- Publish the research results in standard peer-reviewed journals (previous peer-reviewed publishing experience is required).

Data available are in the form of GIS data, Excel files and Access files. All data are therefore already available and stored into dedicated softwares. The successful applicants can therefore start by analyzing data. Papers will be discussed with all partners. The post-doc is expected to write at least four manuscripts during his/her contract. He may also be involved in supervising one or several Master students. It is also likely that a new PHD student will start during the post-doc contract. He will finally share knowledge and experience with other post-docs and PHD students based at Chizé station, working on various agro-ecology aspects, research programs and experimentations currently on the way.

Application review will begin July 1st, 2013, and continue until the position is filled.

To apply, please send a cover letter and curriculum vitae via e-mail to Vincent Bretagnolle

Relevant literature that may be consulted:

- BAMIÈRE L., HAVLIK P., JACQUET F., LHERM M., MILLET G., BRETAGNOLLE V. Farming system modelling for agri-environmental policy design: the case of a spatially non-aggregated allocation of conservation measures. **Ecological Economics**. 2011, **70**, 891–899
- BELLIER, E. MONESTIEZ, P., CERTAIN, G., CHADOEUF, J. & BRETAGNOLLE, V. 2012. Decomposing the heterogeneity of species distributions into multiple scales: a hierarchical framework for large-scale count surveys. **Ecography** 35: 839-854.
- CARSLAKE D., CORNULIER T., INCHAUSTI P., BRETAGNOLLE V. Spatio-temporal covariation in abundance between the cyclic common vole *Microtus arvalis* and other small mammal prey species. **Ecography**. 2011, **34**, (2), 327–335
- GEIGER F., BENGTSSON J., BERENDSE F., WEISSER W.W., EMMERSON M., MORALES M.B., CERYNGIER P., LIIRA J., TSCHARNTKE T., WINQVIST C., EGGERS S., BOMMARCO R., PÄRT T., BRETAGNOLLE V., PLANTEGENEST M., CLEMENT L.W., DENNIS C., PALMER C., OÑATE J.J., GUERRERO I., HAWRO V., AAVIK T., THIES C., FLOHREI A., HÄNKE S., FISCHER C., GOEDHART P.W., INCHAUSTI P. Persistent negative effects of pesticides on biodiversity and biological control potential on European farmland. **Basic and Applied Ecology**. 2010, **11**, (2), 97-105
- Henry, M., Béguin, M., Requier, F., Rollin, O., Odoux, J.-F., Aupinel, P., Aptel, J., Tchamitchian, S. & Decourtye, A. (2012) A common pesticide decreases foraging success and survival in honey bees. *Science*, **336**, 348–350.
- Henry, M., Fröchen, M., Maillet-Mezeray, J., Breyne, E., Allier, F., Odoux, J.-F. & Decourtye, A. (2012) Spatial autocorrelation in honeybee foraging activity reveals optimal focus scale for predicting agro-environmental scheme efficiency. *Ecological Modelling*, **225**, 103–114.
- Odoux, J.-F., Feuillet, D., Aupinel, P., Loubliey, Y., Tasei, J.-N. & Mateescu, C. (2012) Territorial biodiversity and consequences on physico-chemical characteristics of pollen collected by honey bee colonies. *Apidologie*, **43**, 561–575.