Research Project in Agro-Ecology for a Bachelor or Master student from France or Germany

This project is part of a bi-national research cooperation between INRA Dijon and Gießen University. It particularly suits any student in ERASMUS exchange programme.

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Subject:

Weed community composition after annual and perennial crops

Key words:

Agro-Ecology, Biodiversity, Population Demography, Plant Functional Traits, Innovative Cropping Systems, Crop Rotation, Temporary Grassland, Integrated Weed Management.

Abstract:

How a modification of arable land use may alter the flora?

The inclusion of temporary grasslands (pluriannual forage or energy crops) in conventional field crop rotations may have different positive effects e.g. on soil fertility which may decrease the need for external fertilizers. It may also increase the diversity of animals as well as spatio-temporal landscape diversity. The effects on plant diversity and weed populations are less well known but potentially strong, as temporary grasslands are characterized by 1) perennial and rather competitive crop stands 2) the lack of soil tillage during several years but 3) frequent aboveground disturbances due to hay cuttings. We therefore hypothesize that many annual weed species may not be well adapted to these conditions, whereas the opposite may be true for other plant species such as perennials or grasses.

To test our main hypothesis and to better understand the impact of perennial crops on the population demography of wild plants, we established a field experiment in Dijon-Epoisses. Experimental factors include **a)** crop type and species (alfalfa and cocksfoot; wheat and barley), **b)** sowing date (spring and autumn), and **c)** cutting frequency (3 and 5 times per year). From 2006 to 2008, the emerged plant communities showed increasing differences between the experimental modalities (Meiss *et al.*, in preparation). In the proposed project, we will investigate whether there are still differences detectable in the following crop. To study such 'long term' effects, we propose two complementary methods: 1) vegetation relevés within a common test crop that will be sown on each experimental plot and 2) seed bank analyses based on soil core samples.

Exemplary references:

- ALBRECHT H (2005) Development of arable weed seedbanks during the 6 years after the change from conventional to organic farming. *Weed Research* **45**, 339-350.
- CLAY SA & AGUILAR I (1998) Weed seedbanks and corn growth following continuous corn or alfalfa. *Agronomy Journal* **90**, 813-818.
- LIEBMAN M & DYCK E (1993) Crop-Rotation and Intercropping Strategies for Weed Management. *Ecological Applications* **3**, 92-122.

Techniques used:

Vegetation relevés on experimental field, seed bank analyses based on soil samples (visual seed determination or germination assays), univariate and multivariate statistics. Field observations and soil sampling have to be done in Dijon (approx. 2 times one week), whereas soil samples may be analyzed at INRA Dijon or at Gießen University.

Competences required:

Basic knowledge in botanic, vegetation ecology and statistics, English language skills, some basics in French, interest in agro-ecology.