

Modelling multiscale effects of energy crop production on phytodiversity

SFB 299-Transfer Unit 'Integrated Evaluation of Energy Crop Production' Poster 3

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Abstract

In the frame of the ongoing SFB 299-Transfer Unit 'Integrated Evaluation of Energy Crop production' and based on the modelling approach ProF^[1,2], potential effects of energy crop production on phytodiversity are modelled at the patch to the landscape scale. Within the study region 'Southern Hesse', our spatially explicit modelling refers to surroundings of 'optimal sites' for 500 kW biogas plants (cf. abstract Plata & Kuhlmann). Circular areas of 10 km radius around a proposed biogas plant are taken into account. In these 314 km² areas, changes in phytodiversity might result from changes in cropping systems (e. g., increase of maize production) in the context of the operation of biogas plants.

Today's landscape structure of each circular area is analysed in a GIS, focussing on the spatial pattern of arable cropping systems. Patch data on the relative occurrence frequency of the plant species developing in a certain cropping system are derived from field surveys. The GIS data and the data on species frequencies are considered to estimate today's species' occurrence probabilities and total species richness of the arable land at the landscape scale, represented by increasingly larger sub-areas of the analysed 314 km² areas. In an analogous way, estimations on landscape phytodiversity refer to scenarios of future landscape structure that reflect the quality and amount of biomass needed for the operation of the proposed biogas plants. Effects of energy crop production on phytodiversity are quantified by comparison of results with respect to today's and simulated landscape structure.

- [1] Sheridan P., Waldhardt R., 2006. Spatially explicit approaches in integrated land use and phytodiversity modelling at multiple scales. *Alterra Rep.* 1338: 68 – 72.
- [2] Otte A., Reger B., Simmering D., Waldhardt R., 2008. Prognose der Veränderungen von Phytodiversität in Agrarlandschaften. *Ber. Reinh.-Tüxen-Ges.* 20: 67 – 89.

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