

Introduction: The state of agrobiodiversity

Arable weeds have been part of agriculture since the Neolithicum. In the past decades agrobiodiversity has markedly decreased mainly due to herbicides, simplification of crop rotation and high soil fertilization. On organic farms the conditions for rare and endangered arable weeds are more favourable, but the species are not in the soil seed bank anymore. Thus, the aim of the project is to (re-)establish rare arable weeds on organic farms, thus improving integrating biological conservation and modern agriculture. The poster presents the approach of the study groups in Munich; another complementary study group in Kassel is focussing on on-farm-trials on three farms in central Germany.

Pre-study: Acceptance and feasibility of arable weed re-establishment on organic farms

Acceptance study

A questionnaire was sent to 354 organic farmers in Germany in order to explore their attitude to introduction of arable weeds. Out of 45 replying farmers 82% would participate in restoration measures. (Wiesinger et al. 2010)

Feasibility study

Study sites: Franconian Alb and Munich Plain
Seed collection (2007); Sowing of weed seeds in autumn 2007; Munich Plain, three species on two plots on an organic arable field together with winter rye and an underseed; Franconian Alb, one plot on an organic arable field together with spelt.

Results

Munich Plain

0,2% of the sown seeds of *Consolida regalis* established in 2008, no germination of *Lithospermum arvense* and *Silene noctiflora*

Franconian Alb

Melampyrum arvense, *Consolida regalis* established and increased their density until 2011 to more than 100 individuals; *Lithospermum arvense* first germinated in 2010, *Neslia paniculata* and *Silene noctiflora* were not found in the year when grass-clover was sown (Albrecht et al. 2009).

Preliminary conclusions for re-establishment of arable weeds

- Sowing winter-annual arable weeds should be followed by 2 years of winter grain
- A grass-clover coverage should not last >1 year
- Before sowing grass-clover, the field should be ploughed to incorporate the target weeds in the soil seed bank
- No other undersowing like grasses or clover should be implemented nor mechanical weed control should be applied

Cooperative project: Testing principles of ecological restoration and improving methods for restoring arable weeds on organic farms

Field-Methods

Field surveys, experiments and farm trials will be used to investigate the most suitable methods for (re-)establishing arable weeds on organic farms.

Study site: Munich Plain

Target species: *Lithospermum arvense*, *Consolida regalis*, *Legousia speculum-venersis*

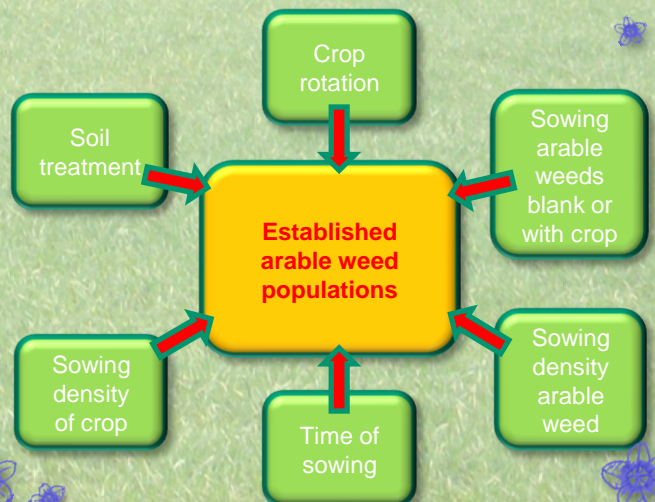
Explanatory variables: Crop rotation, crop density, soil treatment, seed density of arable weed, time of seeding

Target variables: Weed establishment and seed production, seed bank

Modelling approach

Based on the results of the field trials a general model on development of the arable weed populations will be built.

Hypothetical effects on the introduction of arable weeds



References:

- Albrecht, H., Mayer, F. & Wiesinger, K. (2009): Biodiversität und Artenschutz bei Ackerwildpflanzen. ANL. Laufener Spezialbeiträge 2/2009: 135-142.
Wiesinger, K., Cais, K., Bernhardt, T. & van Elsen, T. (2010): Klares Votum für Rittersporn, Frauenspiegel und Co. *Ökologie & Landbau* 153/1: 54-56