

Surveying arable vegetation in Germany - a geobotanical perspective

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Outline

- 1. First data sources about arable plant occurrences**
- 2. 20th century -> phytosociological approaches**
- 3. Comparison data collection: agriculture<->geobotany**
 - sampling period**
 - sampling technique**

1. First data sources about arable plants

-> (detailed) observation data from the Archaeobotany

Finds from excavations

Table 3 Records of *Adonis cf. aestivalis* from prehistoric sites in central Europe

Site	Country	Period	Culture	Literature
Ditfurt	Germany	Middle Neolithic	Walterienburg/ Bernburg	Hellmund (unpublished)
Ilberstedt	Germany	Late Neolithic	Corded Ware	Hellmund (unpublished)
Nesovice/Bucovice	Czechoslovakia	Bronze Age		Tempir (1968)
Löberitz	Germany	Late Bronze age		Hellmund (2004)
Kirchheim-Osterholz	Germany	Iron Age		Rösch (unpublished)
Various sites	Germany	Iron Age	Celtic	Stika (1999)
Riegel-Fronhofbuck, Walldürn	Germany	Roman period		Stika (1996)

taken from Hellmund (2008) *Veg Hist Archaeo*



Fig. 5 Seeds of *Agrostemma githago* from Burgliebenau, Saalekreis



1. First data sources about arable plants

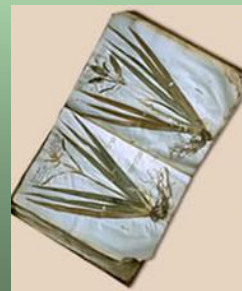
-> (detailed) observation data from the Renaissance

Herbaria

- oldest (known) herbaria from Caspar Ratzenberger (1555-1592)

Stachis, *Sideritis* *Islebiaceo* (*Stachys annua* L.)

near Eisleben in vineyards. near Ryesdorff am Berge 1557



Stored at the Natural History Museum Kassel

1. First data sources about arable plants

-> (detailed) observation data from the Renaissance

Herbal Books

- most famous one of Hieronymus Bock (1539)
- focus on medicinal plants
- pictures with additional (morphological) text information



Mentha arvensis L.

1. First data sources about arable plants

-> (detailed) observation data from the Classicism

Agriculture/Flora Books

- important one for Germany
- > Gmelin 1779 „Weeds on Fields in Swabian“
- oldest record about „Weeds & Agriculture“

detailed description of more than 200 species

- site characteristics
- useful-harmful effects
- community structure



1. First data sources about arable plants

preliminary conclusion

These historical sources are essential tools for vegetation ecologists to understand the development of the arable flora over time!

Problem: they only provide qualitative data

-> focused on species level not on community level!



2. 20th century -> phytosociological approaches

1928 – Josias Braun-Blanquet

-> new method of describing plant communities

-> 1931 first investigations in Germany (Libbert, Hanf)



Aim:

to get more precise data that are collected with standardized methods

-> allowing a formal analysis of the vegetation (qualitative and quantitative data)

also measuring changes/shifts on plant occurrence and plant communities

2. 20th century -> phytosociological approaches

- phytosociology method is still commonly applied
- Germany $\geq 30,000$ arable relevés are available for comparison data
- project initiated to digitalizing these data and compile in databases
 - > archival storage of old relevés at the University of Göttingen

TURBOVEG
JUICE

preliminary conclusion

databases can be used to analyze changes in the abundance/ occurrence of arable plants over several decades, and also over large landscape areas

3. Comparison data collection: agriculture<->geobotany

weed flora surveys conducted under an

- > agricultural economic point of view
- > geobotanical perspective

differences in mapping techniques!



3. Comparison data collection: agriculture<->geobotany

Sampling period

Geobotany

- mostly phytosociological relevé sampling is carried out shortly before harvest time (June-August)

in addition:

- spring (spring-flowering plants, e.g. geophytes)
- late summer (detect stubble-flowering plants)



Agriculture

- mostly in autumn or spring after sowing
- > detect yield decreasing weeds
- > target specific use of herbicides



before harvest <-> after sowing

3. Comparison data collection: agriculture<->geobotany

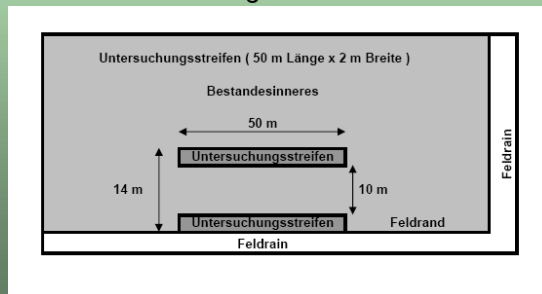
Sampling design

Geobotany

- historical times (<1950s) plot sizes 5-50m² field center
- > characterize weed communities (at field level)

today's situation:

- lower individual numbers -> relevés size enlarged to 200m²
- inner fields/field margins and transect studies (ecotone effects)



monitoring scheme „100 fields for diversity“

3. Comparison data collection: agriculture<->geobotany

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Agriculture

- smaller plot sizes in field interior
- > up to 10 replicates



small plot sizes (0.1-1-10m²) <-> bigger plot sizes (50-200m²)

4. Conclusion

- difficult to combine arable vegetation data from an ecological and agronomic background
- > differences in mapping techniques/periods
- > at least qualitative data (presence/absence) are comparable



but not on community level!



Thank you for your attention!