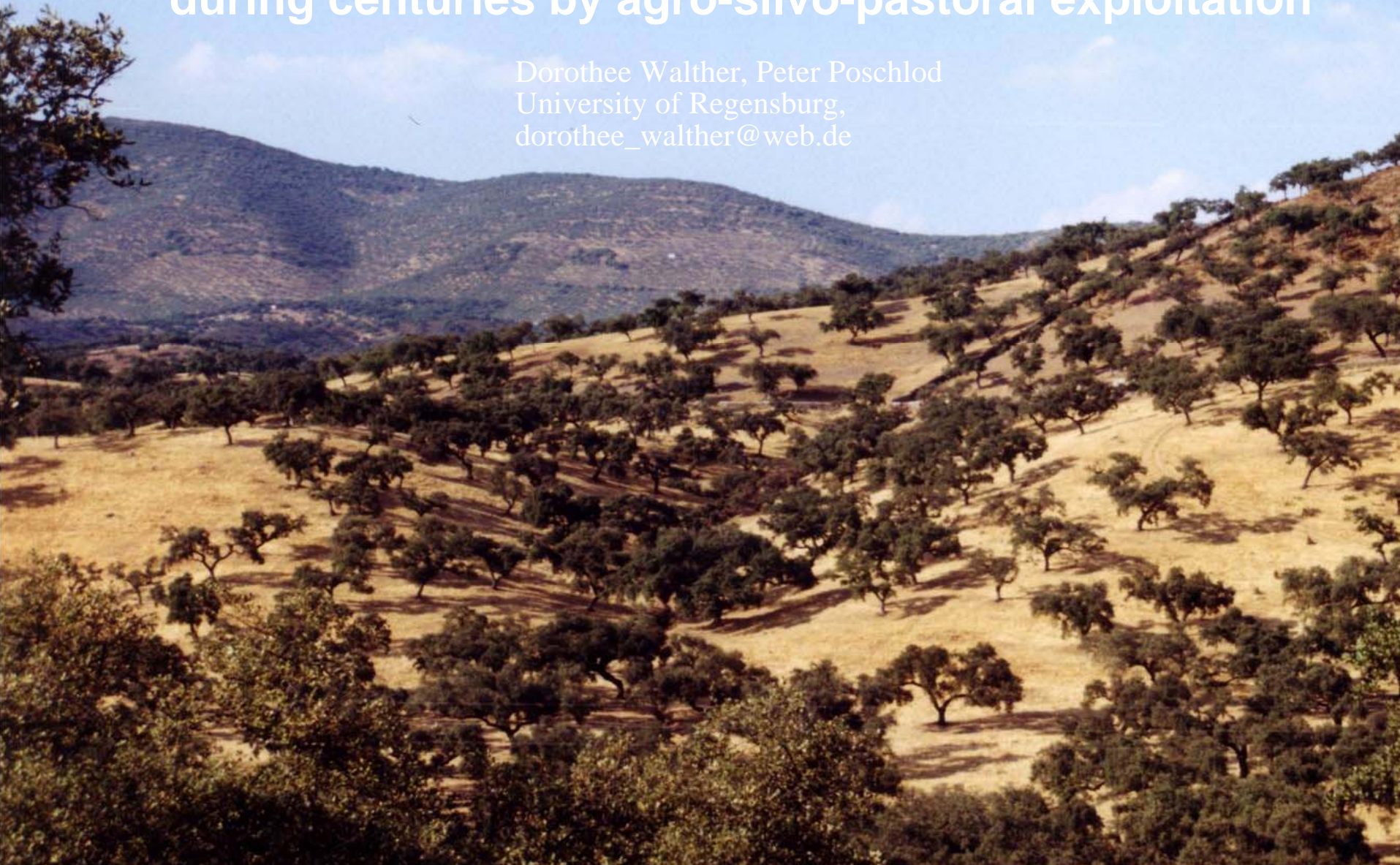


The effects of grazing and management measures on the vegetation of the “Dehesa”- an agro-ecosystem formed during centuries by agro-silvo-pastoral exploitation

Dorothee Walther, Peter Poschlod
University of Regensburg,
dorothee_walther@web.de



Structur

- Habitat
- Objectives
- Study site: Dehesa San Francisco
- Temporal development of differently pastured areas
- Temporal development of burned, ploughed and mulched areas
- Lifespan as a sensitive factor related to disturbance?
- Summary of the results
- Outlook



habitat



- The Dehesa is the result of a century long multi-factorial use
- Development of a varied, species rich landscape
- Disturbances represent an important factor
- Endangering of these areas by abandonment and intensification of exploitation
⇒ disappearance of the disturbance factors

Objective

Investigation of different kinds of disturbances by traditional management systems of the Dehesa

- Permanent disturbance:
Pig pasture, cattle pasture and fallow
- Unique disturbance:
Mulching, ploughing and burning

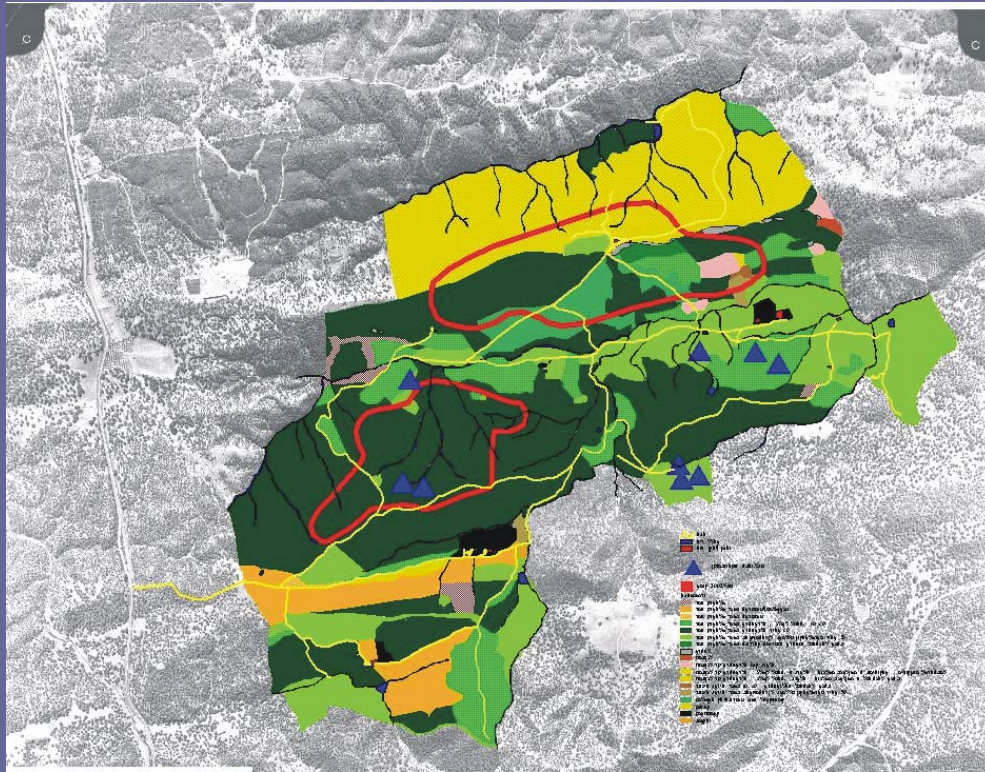
Objective

- Do different disturbance regimes differ in their effects on the vegetation?
- Is lifespan a sensitive factor relating to disturbances?

Dehesa San Francisco

- Open woodland with *Quercus ilex* and *Quercus suber*
- Located in South-West Spain
- Mediterranean climate: hot, dry summers and mild, rainy winters
- 700 hectare area
- Ecological livestock breeding of the Iberian pig and Retinta and Berenda cattle
- Main focus lies on the acorn mast of the Iberian pig for the production of the Jamón Ibérico de bellota

Study site



blue triangles: field experiment 1 & 2
red circles: areas burned in August 2003

- Field experiment 1 was installed in summer 2002: pigs, cattle & fallow
- 200 hectares were destroyed by bush fire in August 2003
- Except of a few areas the farm was ploughed in autumn 2003 in order to reduce the fire risk
- Field experiment 2 was installed in winter 2003/2004: ploughing, burning and mulching
- Records of the cover of the plant species after the method of Schmidt (1974) in 2x2m squares

Field experiment 1

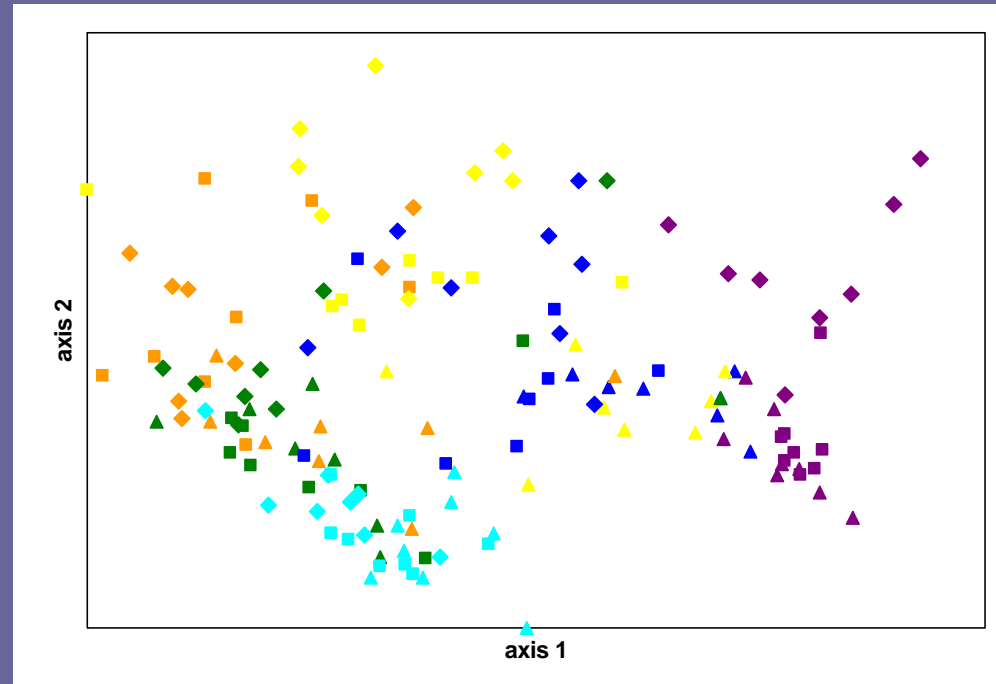
- Installed in summer 2002
- Comprise pig pasture, cattle pasture and fallow, subdivided in higher slope (slope $>15\%$) and minor slope (slope from 0-15%)
- plots are situated in the non-shaded areas in the southern slope



Field experiment 1

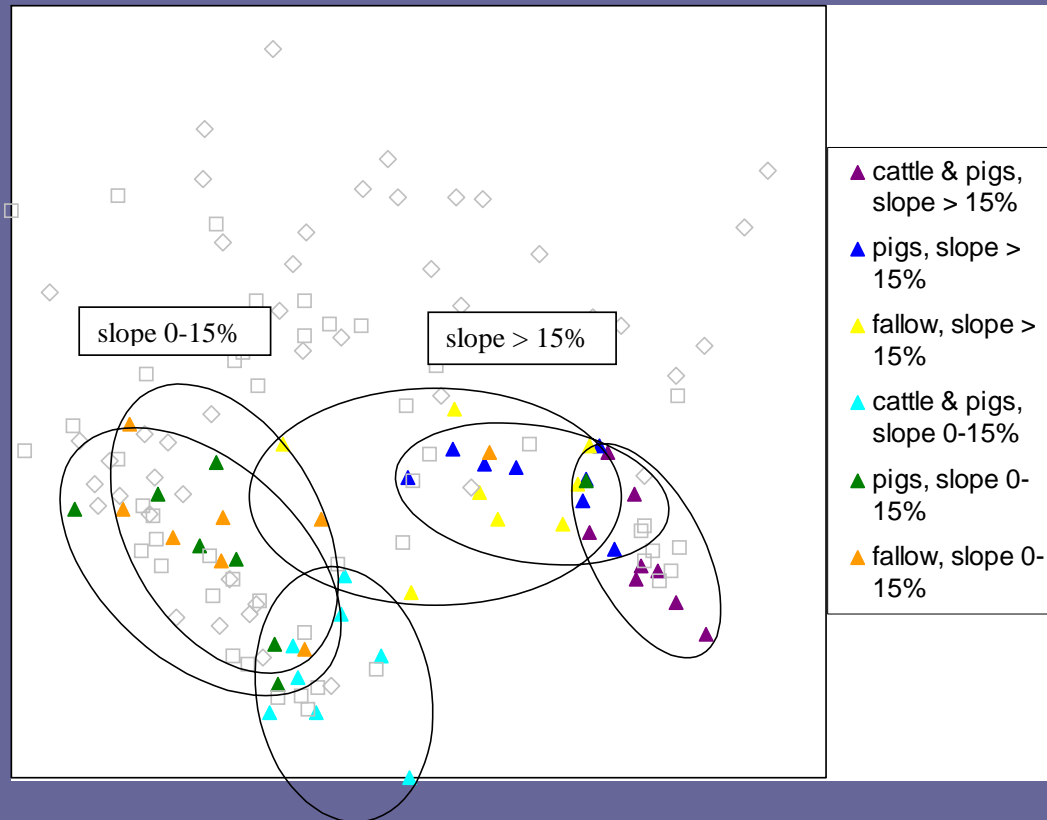
Detrended
Correspondence Analysis
of vegetation samples of
the differently grazed
areas from 2003 to 2005:

The closer the plots are
situated to each other the
similar is their vegetation



Field experiment 1

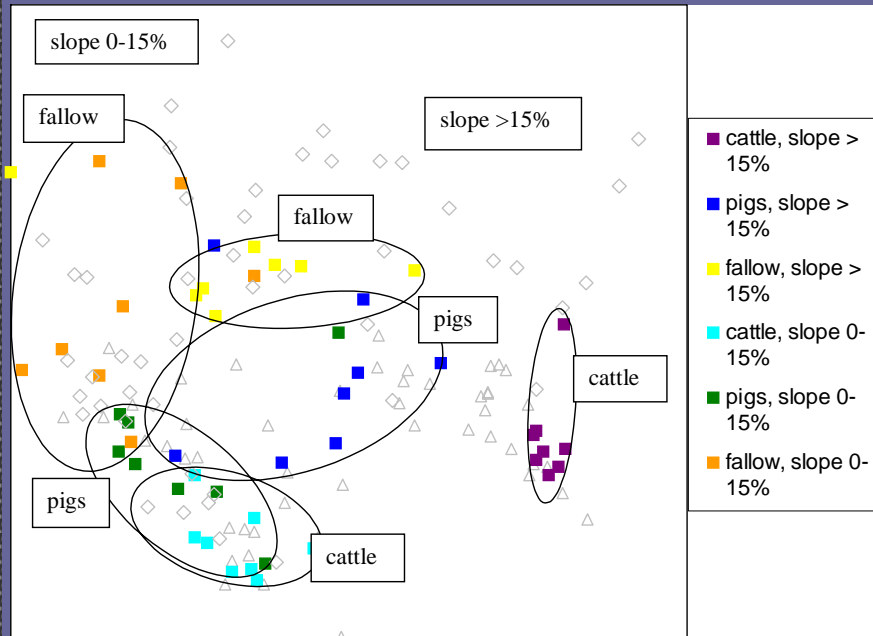
2003



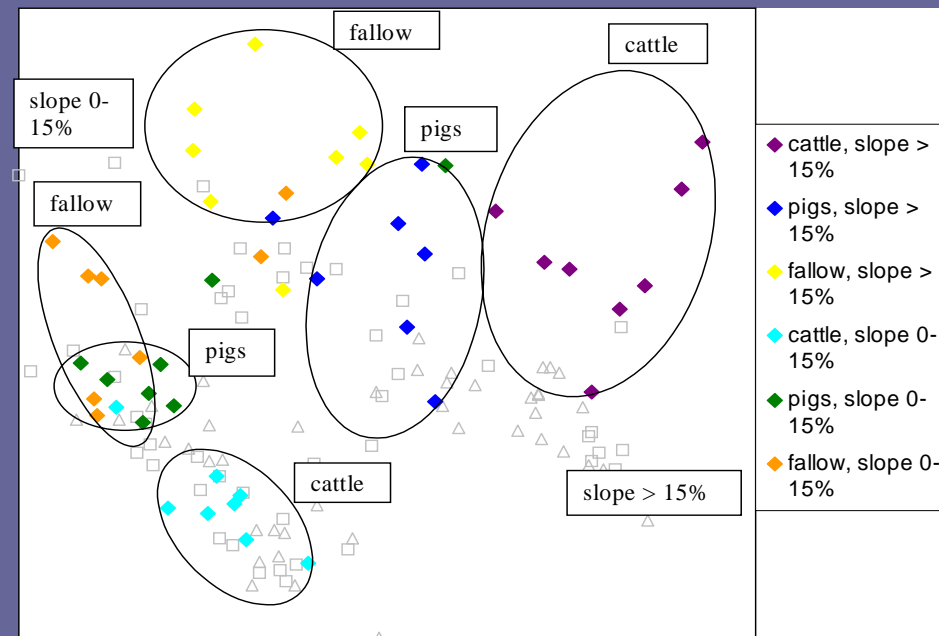
- Only small differentiations occur between the areas
- Influence of the slope :
the left hand side slopes of 0-15%, the right hand side slopes > 15%

Field experiment 1

2004



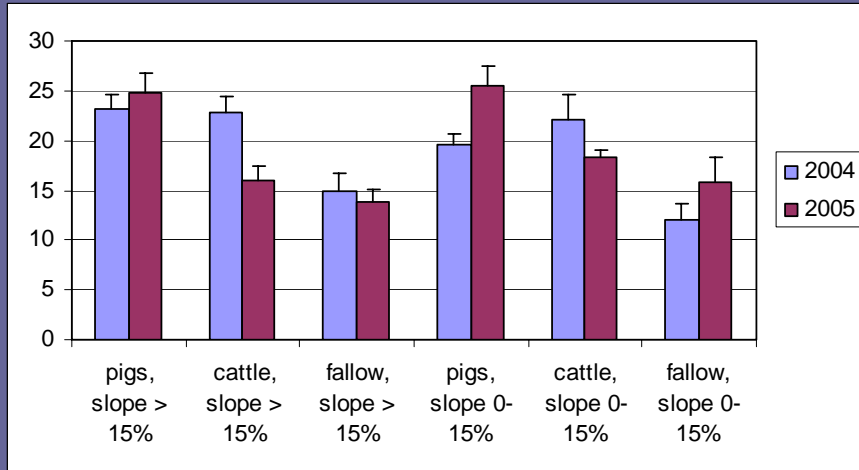
2005



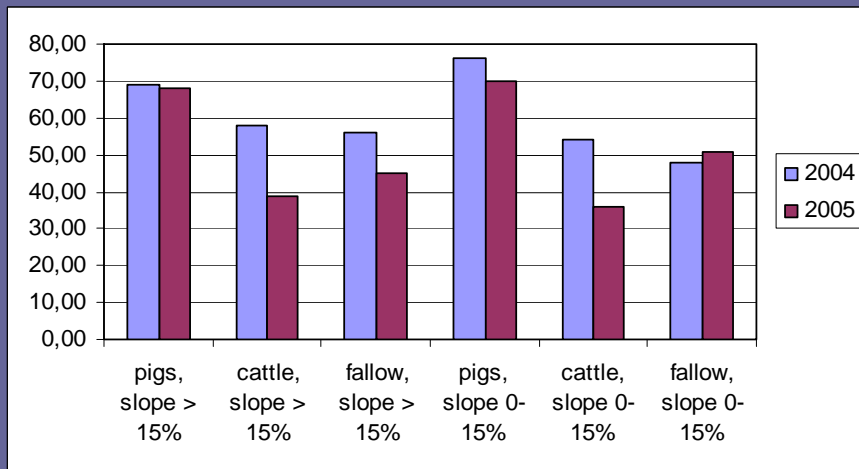
Different development of the differently grazed areas in both years:

At the bottom are the cattle pasture situated, in the middle the pig pasture and at the top the fallow

Field experiment 1



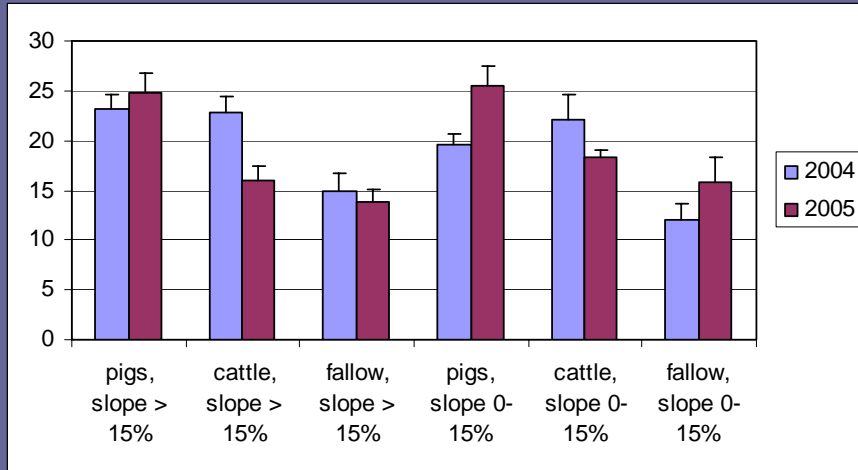
Plant species per plot



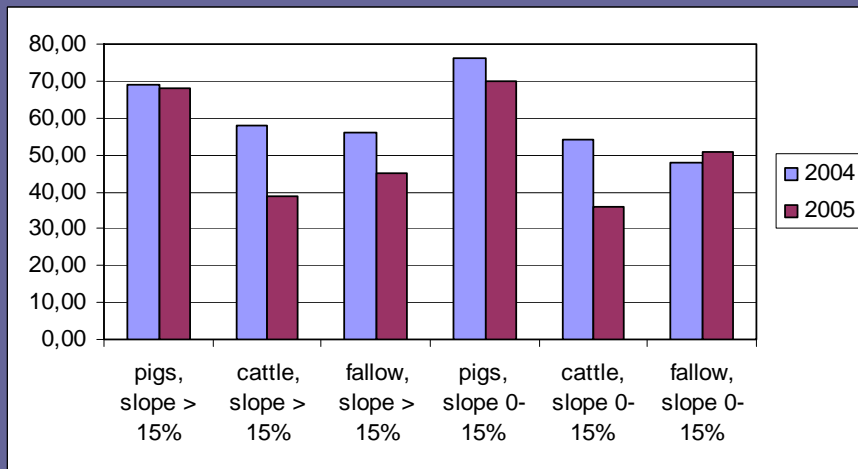
Entire species number of one area

Field experiment 1

Pig pasture



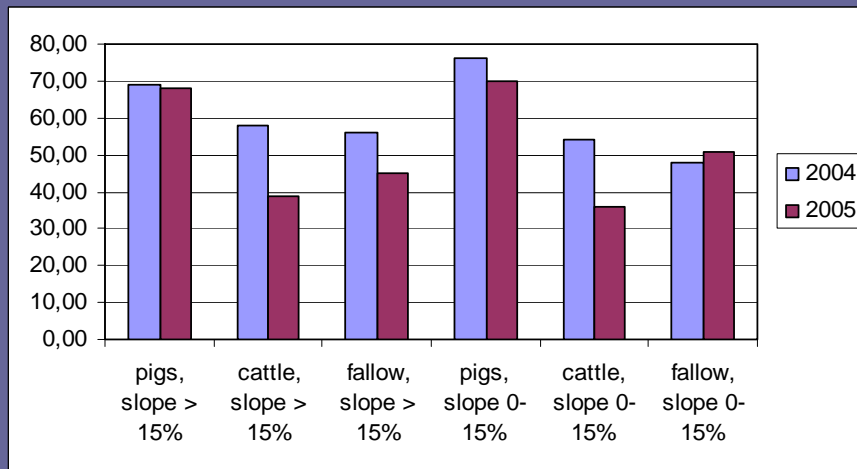
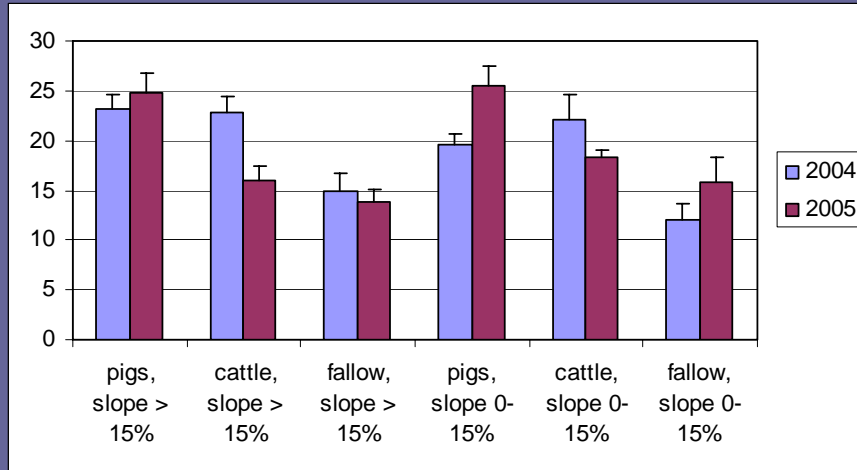
- Pig pasture has the highest number of species per plot as well as the highest entire species number



- Reason: Digging of pigs usually results in the creation of microsites in different successional states and in the creation of competition-free areas

Field experiment 1

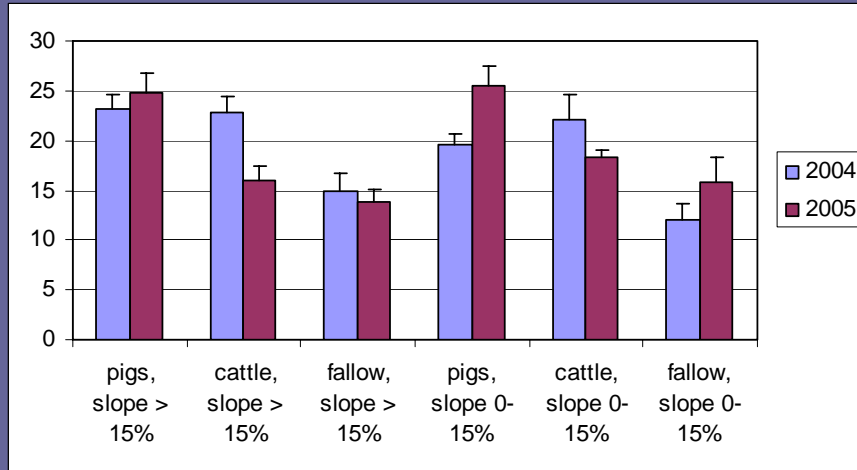
Cattle pasture



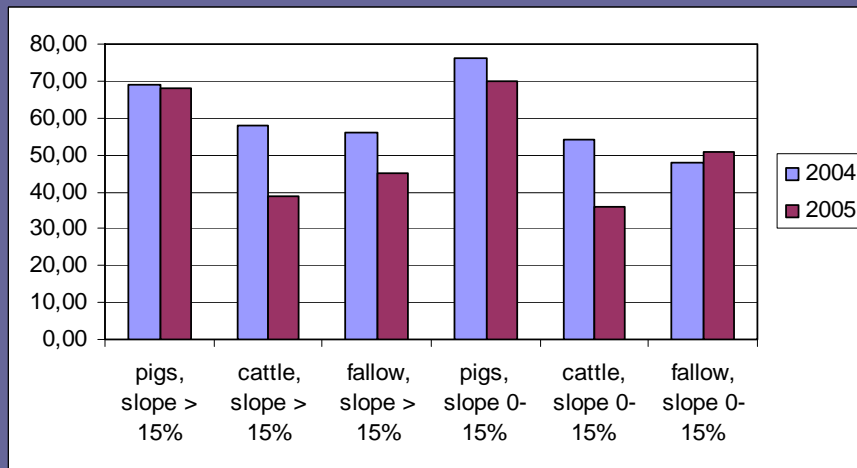
- Medium number of species and entire species number
- Due to the strong grazing pressure and the grazing behaviour of the cattle arise an almost closed, regular vegetation

Field experiment 1

Fallow

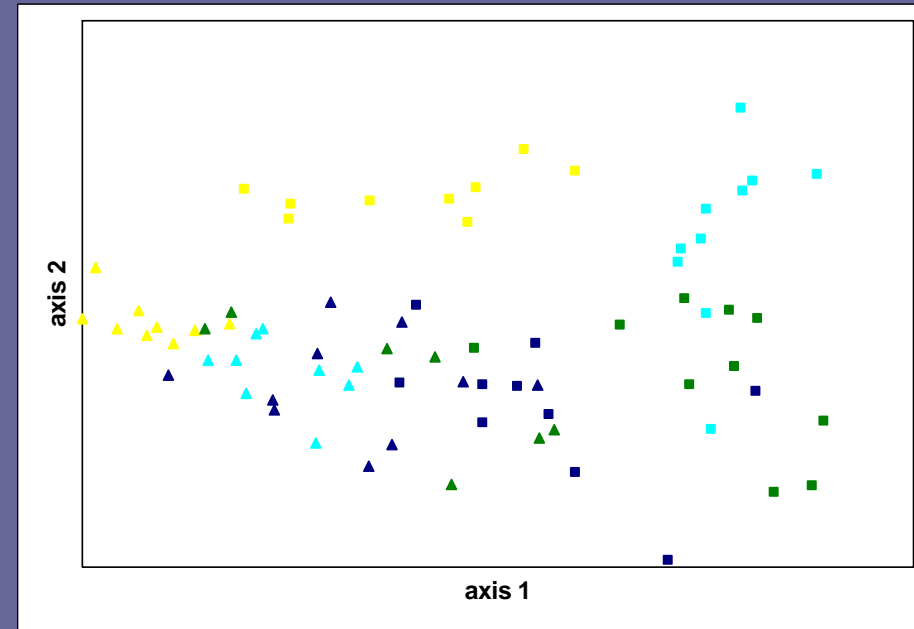


- Smallest number of species per plot and a relatively high entire species number
- Due to small disturbances sometimes small patches with a relatively high diversity can emerge between the dense and species lacking vegetation



Field experiment 2

Detrended Correspondence
Analysis of vegetation samples
of ploughed, mulched, burned
and burned & ploughed areas of
the years 2004 and 2005



All treatments are single disturbances and comprise the removal of the aboveground biomass.

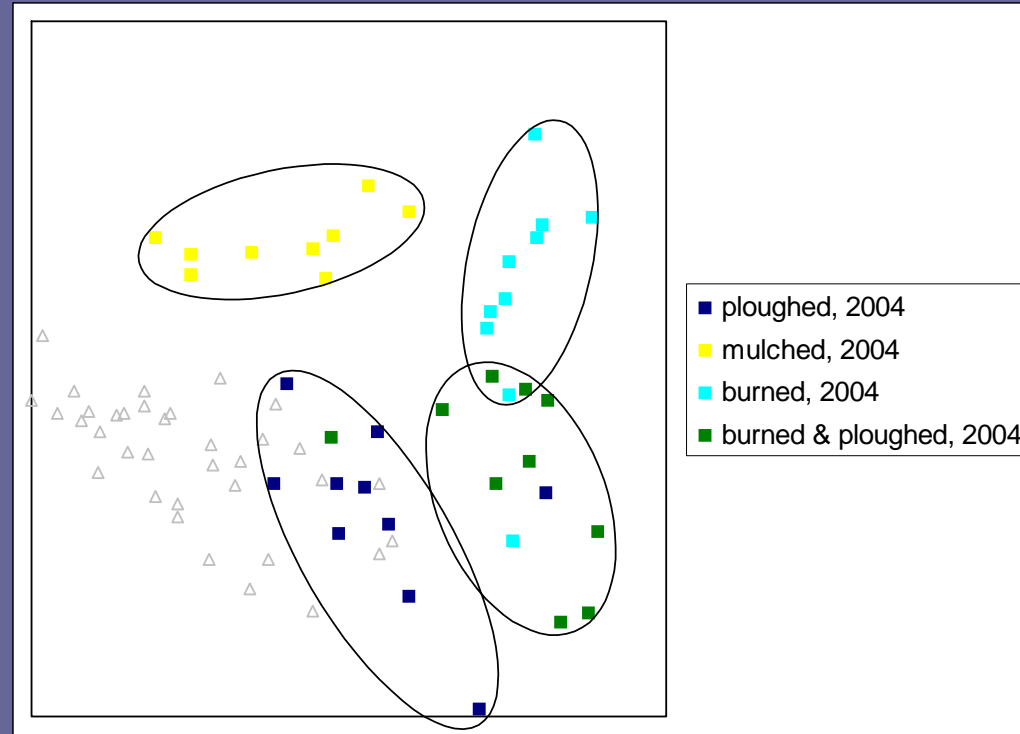
In which direction develop the areas?

in the old, cattle grazed situation

or another state, influenced by the different kinds of disturbances?

Field experiment 2

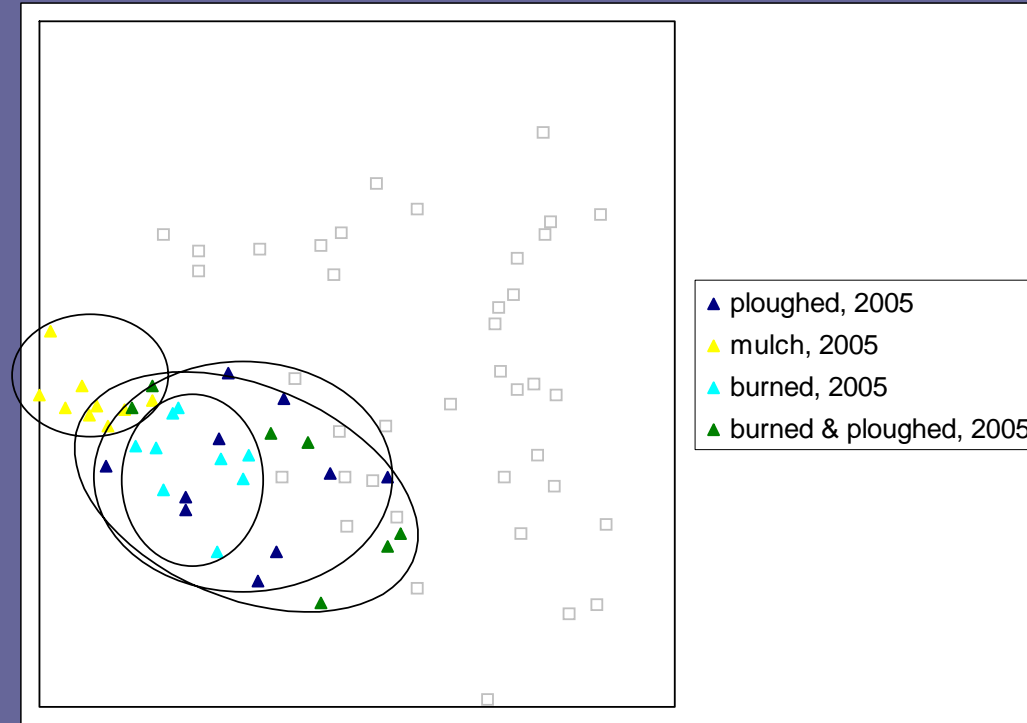
Year 2004



- Differentiations of the areas are obvious
- Mulched area is plainly separated
- The burned and additionally ploughed area is situated among the burned (at the top) and ploughed area (at the bottom)

Field experiment 2

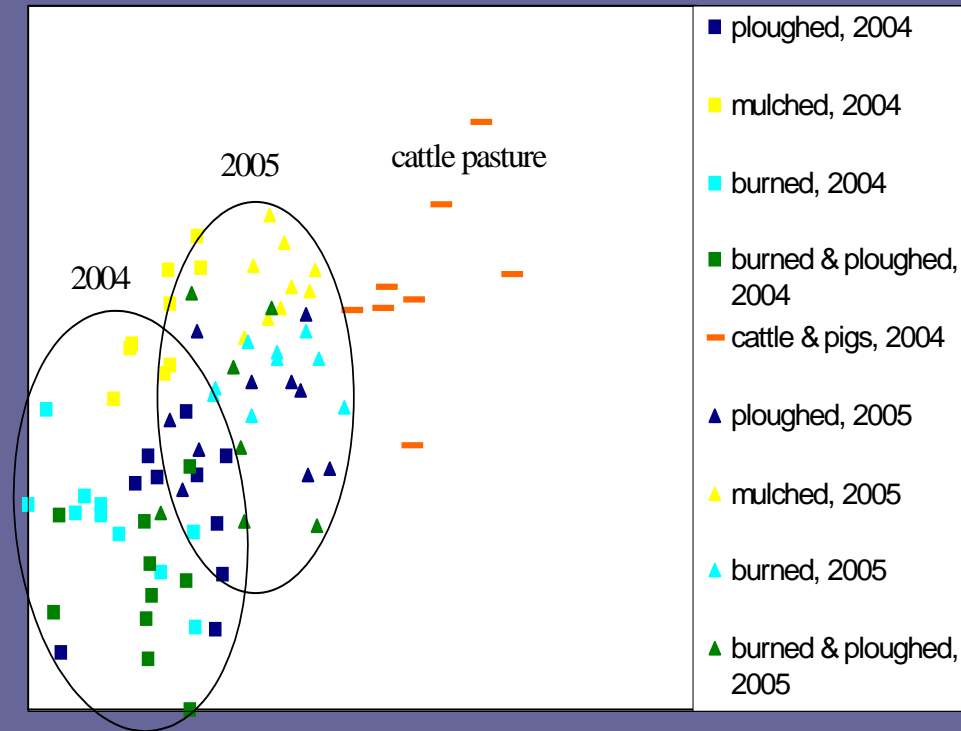
Year 2005



- Plots of the ploughed, burned and burned and additionally ploughed areas seemed to be in one line \Rightarrow fast succession
- Burned plots create a narrow group in the middle of the other areas
- Additional ploughing of the burned area seems to overlay the effect of burning

Field experiment 2 & cattle grazing

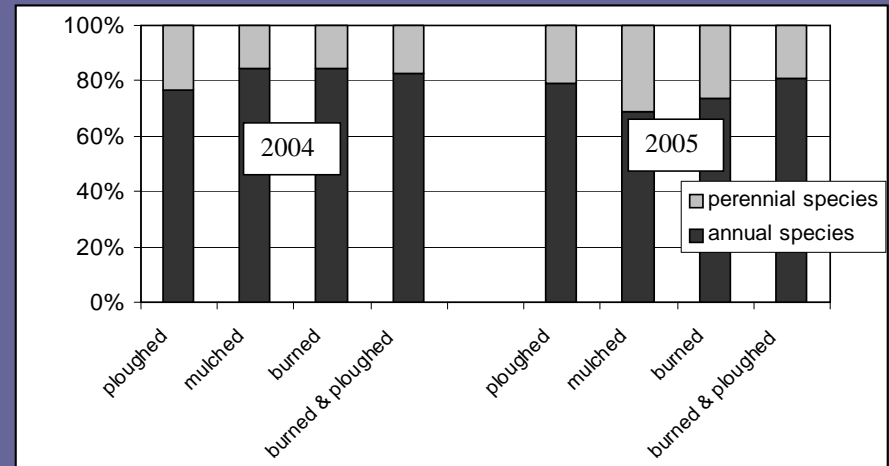
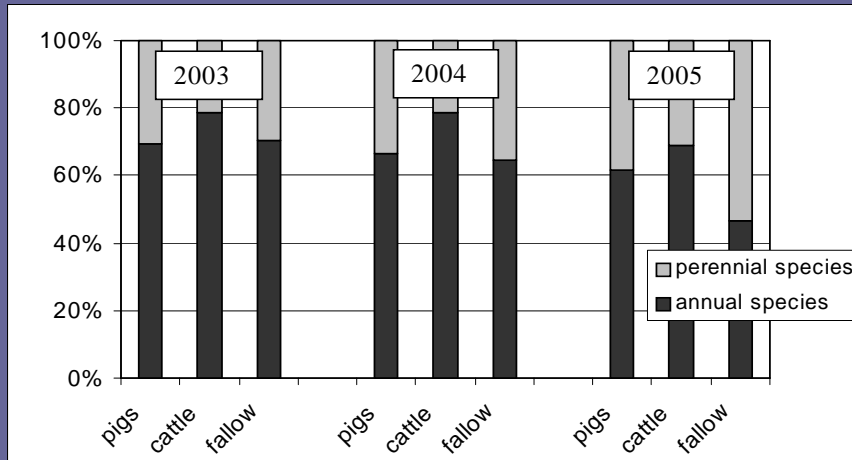
Detrended Correspondence Analysis of the vegetation samples of the ploughed, mulched, burned and burned and additionally ploughed areas of the years 2004 & 2005 and the cattle grazed pasture of the year 2004



- In 2005, the approach of the differently managed areas towards the cattle grazed plots is visible.
- Only the next years can show whether the development is the display of a fast succession or whether it is caused by another influence

Lifespan

Lifespan of the areas of field experiment 1 and field experiment 2



Grazing regimes:

The increase of annual species relating to pig pasture could not be shown.

Unique disturbance:

The ploughed area has the highest percentage of annual species.

Summary

- The differentiation of the areas with different grazing regimes is clearly visible
- The different reaction to the unique disturbance - ploughing, mulching, burning and burning with additional ploughing - which all comprised the removal of the aboveground biomass, is obvious
- However, the sensitive character of lifespan regarding to pig grazing could not be confirmed in this study.

Outlook

As disturbance differ in their influence on the vegetation, we need indicators for this influences to predict the reactions of the vegetation to changes in the disturbance regimes

Further target:

Identification of additional sensitive indicators, or plant functional traits, to describe the effects of different disturbances on the vegetation composition.

