



The Effect of Grazing by Cattle and Pigs on Mediterranean Dehesa Vegetation



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Situation
The decline of open habitats by abandonment and intensification of cultivation represents a global problem. These often very valuable habitats as well as their adapted flora and fauna can only be kept with an adjusted management systems. The **Dehesas** in Spain and Portugal – descended from the Bosque mediterráneo, the Mediterranean hard leaves forest – are the result of a century long multifactorial use by different livestock (cattle, sheep, goats and pigs), production of firewood and cork as well as extensive agriculture exploitation (Hampe, A., 1993, Montero, G. et al., 1998). However, until now there is no idea if other livestock than cattle have a specific influence on the Dehesa vegetation and if this results in the promotion or decline of specific species or species groups. Therefore, species composition and richness were studied to assess the effect of the different grazing regimes as well as abandonment. Furthermore, the proportion of different lifespan categories was analysed since in a study from central Europe this was shown to be a sensitive indicator to grazing by pigs (increase in annuals; Neugebauer, K.R., 2004).



Study sites

Field work has taken place at the farm "Dehesa San Francisco", a well-preserved dehesa (open woodland with *Quercus ilex* and *Q. suber*) located 70 km north of Sevilla. The farm is run by Fundación Monte Mediterráneo with ecological livestock breeding of pigs, cattle and sheep on 700 ha. Vegetation data were sampled in permanent plots after the method of Schmidt-Londo.

Results

Fig.1 shows a specific vegetation differentiation caused by the grazing regimes. However, factors as slope and degree of shrub cover have also an effect.

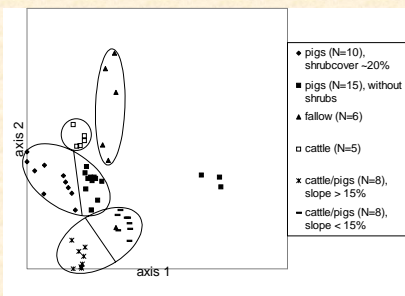


Fig. 1: Detrended Correspondence Analysis of vegetation samples of differently grazed areas in spring 2004. N= number of plots. Axis 1 accounts for 32%, axis 2 for 16% of variance (Relative Euclidian distance, cut-off-value for species vectors: $R^2=0,1$). The separation of the plots is not only caused by different grazing systems. Separation also occurs within identical grazing systems through other factors (slope and degree of shrubcover).

As expected from the results from Central Europe (Neugebauer, K.R., 2004), the pig pasture shows the highest plant diversity but, in contrast, not the highest rate of annual plant species (Fig.2).

Also the smallest number of species as well as the least proportion of annual species of the fallow fit with the results from Central Europe.

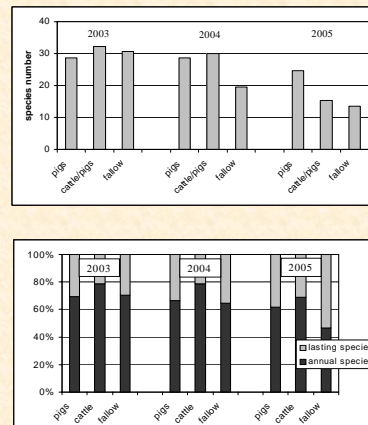


Fig. 2: Development of different pastures of the "Dehesa San Francisco", from the first year after the construction 2003 until 2005. **At the top:** Plotted is the average and the standard error of plant species per area calculated from the samplings of the vegetation. **Below:** Plotted is the percentage of annual to perennial species per plot calculated from the samplings of the vegetation.

However, not only grazing but also exposition of the slopes has a strong effect on vegetation composition. Grazed areas without and with shrubs on south exposed slopes are more similar to each other than grazed sites without shrub cover on south and north exposed slopes. Also by lifespan the influence of the site factors are visible.

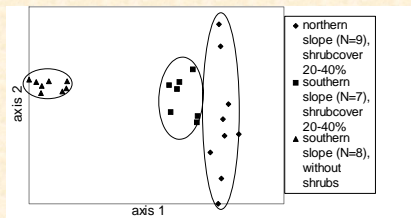
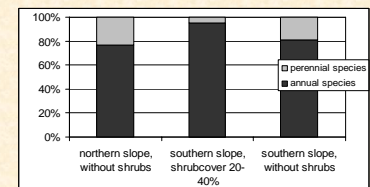


Fig. 3: Detrended Correspondence Analysis of vegetation samples of different slopes (inclination >15%) grazed by pigs and cattle in spring 2004. N= number of plots. Axis 1 accounts for 76%, axis 2 for 4% of variance (Relative Euclidian distance, cut-off-value for species vectors: $R^2=0,1$).

Below: Plotted is the percentage of annual to perennial species per plot calculated from the samplings of the vegetation.



Literature

- Hampe, A. (1993): Extremadura – Naturreichtum durch Tradition. – Stiftung Europäisches Naturerbe.
Montero, G., San Miguel, A. & Canellas, I. (1998): Systems of mediterranean silviculture "La Dehesa". – in: Agricultura Sostenible, S. 519-554
Neugebauer, K.R. (2004): Auswirkung der extensiven Freilandhaltung von Schweinen auf Gefäßpflanzen in Grünlandökosystemen. Dissertationes Botanicae 381: 1-151..

Conclusions

As expected, different grazing systems result in a different composition of vegetation. However, the sensitive character of lifespan regarding pig grazing could not be confirmed in this study. For this, we hope to find other, more sensitive indicators to describe the effects of pig grazing compared to cattle grazing and fallow.

It can be concluded that in the investigated area the grazing effects are partly overlapped by additional factors such as abiotic factors or shrub encroachment. However, besides grazing, other factors have to be considered additionally and have to be filtered out carefully.



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