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# Spatial correlations of plant functional traits in a diverse pasture

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Plant functional traits regulate terrestrial processes, including soil carbon storage, which is one of the most important component in global carbon cycle. Traits of dominant plant species are key components of carbon sequestration in terrestrial ecosystems. Variability of plant species compostition and spatial distribution also plays an important role especially in diverse grasslands.

The purpose of this study was to determine different functional plant traits based on vegetation composition analysis and ecophysiological measurements and capture connections between the variables under varying environmental conditions. Another objective was to describe temporal variability in the spatial patterns of plant diversity.

To monitor spatial and temporal variability we made spatially explicit measurements of variables including environmental (soil water content, soil temperature, altitude) and functional (traits based on vegetation composition survey, soil respiration, FDA hydrolysis- and biomass data, VIGreen index) factors during four measurement campaigns in a diverse pasture. Nearly 70 plant species were recorded on the study site. Sampling was conducted in $80 \times 60$ meter grids of 10 meter resolution with 78 sampling points in the study area.

We applied principal component analysis (PCA) to compare the changes of 12 variables from active spring period to autumn senescence. The analysis consisted of three background factors and nine functional traits. Soil water content, soil temperature and altitude were employed as background factors. Three traits were created from vegetation composition survey data: diocots/monocots ratio, C4/C3 plants ratio and legume/not-legume ratio. Six more functional traits were VIGreen index, soil respiration, biomass production and fluorescein diacetat (FDA) hydrolysis. To describe species diversity we calculated Shannon diversity index for each position in the grid.

PCA results showed a permanent connection between Shannon diversity and dicot/monocot ratio in all measurements. This data indicated that dicots were crucial part of diversity. The link between soil respiration and legume/not legume ratio was temporally variable. The correlation was detected in active periods, but not in dry period. According to this result soil respiration is determined mainly by legumes in active periods. The C3/C4 ratio had a strong negative association with VIGreen in spring and autumn, but not in summer. This period coincided with biomass peak of *Cynodon dactylon*, which is outstandingly dominant C4 species in the area. Data were also analyzed using kriging to monitor the changes on diversity maps.

We concluded that spatial variability of all variables were high in this scale and both the links between the variables and the spatial pattern of them varied among the main phenological stages of the vegetation.