Allegato 4a_3

Resource quantity and quality in Val Trupchun

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Introduction

How ecologically similar species coexist in a shared habitat is one of the most central questions in ecology and directly relates to the niche concept. Resource ecology, the ecology of trophic interactions between consumers and their resources, is an integral part of this concept. Theory tells us for example, that despite overlapping ecological requirements (overlapping habitats) coexistence may be possible if resources such as forage are partitioned in space and/or time. Indeed, mobile species may choose to specialise on a particular diet so as to gain exclusive use of certain resources and habitat heterogeneity may also reduce competition among species. The first step to analyse possible resource partitioning is to determine the amount and quality of the resources available in a given habitat.

Methods

We established 30 unfenced plots measuring 6 m x 6 m covering the whole range of vegetation nutrient and fibre content in the Val Trupchun and performed clipping experiments in June, July and August 2012 and 2013. The plots were homogenous in plant species composition and cover. In the plots we clipped the vegetation in randomly selected 20 x 200 cm strips. The samples got sealed in plastic bags immediately after clipping and weighted the same day, to determine wet biomass. Afterwards, samples were dried in the oven at 65° for 48 hours. In a next step, samples were fine-ground to pass a 0.5 mm screen. One third of the samples were used for chemical analysis of carbon and fibre content.

Carbon content was determined on a LECO induction furnace at 1000°C (LECO Corp., St. Joseph, MI, USA). Fibre content was analysed using an ANKOM 200 Fibre Analyser (ANKOM Technology, Macedon, NY, USA). Afterwards, all vegetation samples were scanned using a laboratory NIR spectrometer (MPA Multi Purpose FT-NIR Analyzer, Bruker Optics GmbH, Fällanden, CH). The chemically analysed samples were used to refine previously established models predicting carbon and fibre content. Carbon and fibre content of the remaining two thirds of the samples were predicted using these models. Thus, laboratory NIR significantly reduced the time and effort compared to conventional chemical analysis.

Results

Although biomass did increase somewhat between June and August, no significant differences were found (Figure 1). Similarly, we did not found any significant differences in carbon although the range narrowed (Figure 2). However, acid detergent fibre (ADF) an indicator of total fibre content decreased significantly over the summer period (Figure 3).

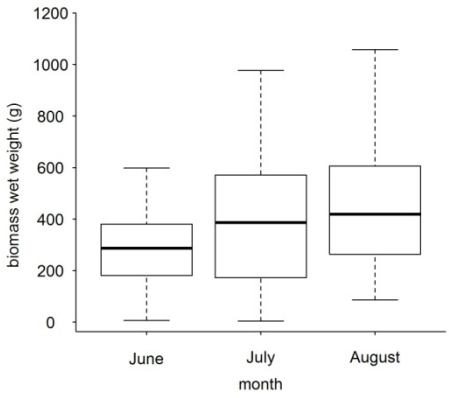

Fig. 1: Boxplot for biomass (wet weight) during the summer period in Val Trupchun. Horizontal bars represent the median, box heights the interquartile range, and whiskers span 1.5 x interquartile range. Outliers (>1.5 x interquartile range) are not shown. Different letters above the whiskers indicate significant differences ($p < 0.01$) between the groups.

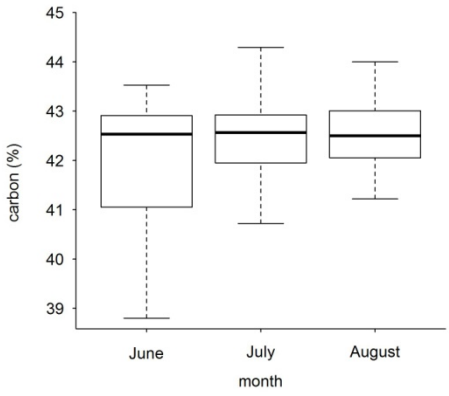

Fig. 2: Boxplot for carbon content of the vegetation during the summer period in Val Trupchun. Horizontal bars represent the median, box heights the interquartile range, and whiskers span 1.5 x interquartile range. Outliers (>1.5 x interquartile range) are not shown. Different letters above the whiskers indicate significant differences ($p < 0.01$) between the groups.

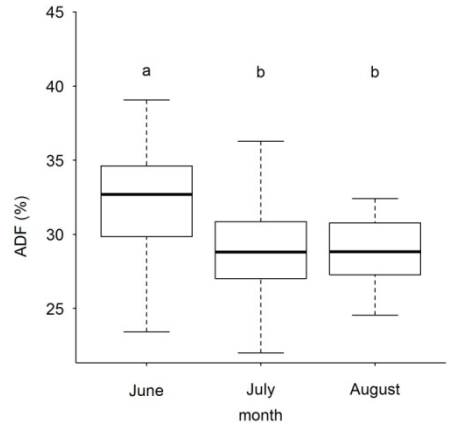

Fig. 3: Boxplot for acid detergent fibre (ADF) during the summer period in Val Trupchun. Horizontal bars represent the median, box heights the interquartile range, and whiskers span 1.5 x interquartile range. Outliers (>1.5 x interquartile range) are not shown. Different letters above the whiskers indicate significant differences ($p < 0.01$) between the groups.

Discussion

The differences in biomass over the summer period were not as pronounced as we initially expected. However, in our opinion this was mainly due to the large range of biomass observed in July and August. Carbon content of the vegetation can likewise be interpreted as a proxy for biomass and fibre content. Since fibre content decreased significantly during the summer season, the more narrow range of carbon content in July and August confirms the

tendency for an increase in biomass over the summer period. The decreasing fibre content points towards a short nutrient peak in midsummer. This period of high nutrient availability may become crucial for ungulate community in Val Trupchun when building up their reserves for the long winter period. Future studies will concentrate the spatial patterns of resource availability and the effects these patterns have on ungulate space use.