EFFECTS OF THE FREQUENCY OF GRASSLAND UTILISATION ON THE COMPOSITION OF VEGETATION IN DIFFERENT GRASSLANDS

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Summary: More than 11% of the area of Hungary (1.02 million ha) is under grassland management. A significant proportion of this area is occupied by extensively used fields where fodder is grown. Extensive grassland management does not necessarily exclude multiple harvests within one season. In our experiments, we tested the effect of cutting frequency on the species composition of grassland vegetation.

Utilisation frequencies (2, 3, 4 cuttings annually) were simulated by the same method at two sites, without fertiliser applications. The utilisation frequency of 2 cuttings/year was represented by a late first cutting (third decade of June) and an autumn cutting. The utilisation frequency of 3 cuttings/year was represented by vegetation surveys performed in the third decade of May, at the end of July and at the beginning of October. The utilisation frequency of 4 cuttings/year meant surveys in May, at the end of June, the end of July and at the beginning of October.

In Mende, on a planted, wet meadow, surveys on vegetation composition mostly yielded less than 10 species. In Bösztör, on a dry, natural pasture, the number of identified species varied between 35-40.

From the relative ecological indicators (BÖRHEID 1993), the distributions of relative temperature demand (TB), relative nitrogen demand (NB) and social behaviour types (SBT) were analysed.

According to the results of the examined 2 years, we may conclude that from the 3 different utilisation frequencies, the treatment with 3 cuttings/year had the most significant beneficial effect on maintaining or establishing a near-natural vegetation. Further research is needed to confirm long time impacts.

Introduction

More than 11% of the area of Hungary (1.02 million ha) is under grassland management. The area of grassland has decreased significantly in recent decades as pieces of land of better quality have been transformed into arable fields (BARCSÁK et al. 1986). Pastures and meadows on poor soil yield 1.5 t/ha hay annually, on average (SZEMÁN 1994). Yields have been increased primarily by using artificial fertilisers. As it was determined by BARCSÁK (1981), when NPK fertilisation is applied in an optimum ratio (1:0.4:0.4), 1 kg of active N component increases dry matter contents by 20%. The amount of nutrient supply necessary to increase the yield of different grassland types has been studied extensively (BARCSÁK 1991, NAGY 1989, 1991, SZEMÁN 1991a, 1991b, 1994).

With the drastic decrease in livestock numbers since the 90s, increasing yields is not as significant an issue as it used to be. As an alternative, new, environmentally friendly methods of pasture management have been introduced, e.g. organic and extensive grassland management (ÁNGYÁN et al. 1997).

Extensive grassland management does not necessarily exclude multiple cuttings within one season. In our experiments, we tested the effect of cutting frequency on the species composition of grassland vegetation and the related potential changes in composition.

**Materials and methods**

Experiments were carried out in 2006, 2007 and 2008, at two locations, on flat ground. At one site (Mende), the experimental field, a wet meadow planted previously with *Festuca arundinaceatum* vegetation, was located in a valley, while at the other site (Bösztör) a dry saline grassland with *Festuca pseudovinetum* vegetation (in Bösztör) was used. Both sites are managed organically; no artificial fertilisers are applied. In the autumn of 2006, the manure dropped by grazing animals was simulated by broadcasting slurry, as the pastures were only mowed. Grasslands were utilised at 3 levels of intensity, represented by the number of cuttings (Table 1.)

**Table 1. Details of treatments**

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<tr>
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<th>2 cuts/year</th>
<th>3 cuts/year</th>
<th>4 cuts/year</th>
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<tr>
<td>1st growth</td>
<td>19 Jun.</td>
<td>17 May</td>
<td>17 May</td>
</tr>
<tr>
<td>4th growth</td>
<td></td>
<td>10 Oct.</td>
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Treatments were applied in 3 replicates. Vegetation composition was surveyed using the quadrat method Balázs, where the areas occupied by the different species inside the quadrat are expressed as coverage, or dominance value (DB). The dominance value is proportional to the area utilised by a given plant species. The highest possible value for DB is 32, standing for a surface coverage of 100%.

From the relative ecological indicators (BORHIDI 1993), the distributions of relative temperature demand (TB), relative nitrogen demand (NB) and social behaviour types (SBT) were analysed.

**Results and their discussion**

Prior to discussing dominance values, the differences between numbers of plant species at the two examined sites should be mentioned. In Mende, on the planted, wet meadow, surveys on vegetation composition yielded less than 10 species in most of the cases. In Bösztör, on the dry, natural pasture, the number of identified species varied between 35–40.
Classifying the examined sites according to the temperature demand shows a clear difference between the grasslands at Mende and Bőször. The grassland in Mende (Figure 1.) is mostly dominated by TB 5 vegetation (zone of montane deciduous mesophile forests). In 2008, in the plots with cutting frequencies of 2 and 4, the coverage of TB 6 species decreased; these species were replaced by the aforementioned TB 5 vegetation.

In Bőször (Fig. 2.), the grassland is mostly dominated by the plant species of thermo-phile forests and steppic woods (TB7) and the submediterranean sibljak and steppe zone (TB8). As a result of the increased frequency of cutting, the proportion of plant species of higher temperature demand increased. In the treatment with two cuttings, the first cutting is rather late (second half of June), thus the first growth after cutting has a significant shading effect. This may explain the proliferation of species with a lower temperature demand in the case of extensive management.

According to the graph demonstrating the relative nitrogen demand of plant species at the sites (Figure 3., 4.), the Bőször site is characterised by species of moderately oligotrophic and submesotrophic habitats. Species indicating nitrogen overload (NB 6, 7, 8, 9) were not identified in high numbers in Mende either; the site was dominated by the species of submesotrophic and mesotrophic habitats.
The graph of social behaviour types shows a dominance of disturbance tolerant, naturally occurring species (DT) in Mende (Figure 5.). Competitor plant species (C) indicating natural conditions have also appeared.

In Bösztör, species indicating natural condition (C, S, G, NP) were found in higher numbers than species indicating disturbance (Figure 6.). Natural competitors (C) occupied almost 50% of the area. Endemic weed species were found only in low numbers. Rural competitor species of the endemic flora benefitted from the cutting frequencies of 2 and 4 (16.5% and 13.7%, respectively) as opposed to 3 cuttings/year (8.5%).
As SBT values indicate the natural or disturbed nature of the relationship between plant species and their habitats, they may be attributed with indicator values of naturalness. For the wet grassland of good nutrient supply in Mende, indicator values were between 202–216.

For the grassland characterised by a high number of species and low nutrient supply, indicator values were between 350-402. As a result of cutting the grass 2 or 4 times a year, indicator values decreased (to 350 and 354, respectively) whereas the treatment with 3 cuttings resulted in significantly higher values (402).

According to the results of the examined 2 years, we may conclude that from the 3 different utilisation frequencies, the treatment with 3 cuttings/year had the most significant beneficial effect on maintaining or establishing a near-natural vegetation. Further research is needed to confirm long time impacts.

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References


A GYEPHASZNÁLAT GYAKORISÁGÁNAK HATÁSA A NÖVÉNYÁLLOMÁNY ÖSSZETÉTELÉRE KÜLÖNBÖZŐ GYEPEKNÉL

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Kulcsszavak: hasznosítási gyakoriság, relatív ökológiai mutatók, biodiverzitás, természetközi vegetáció

Összefoglalás: Magyarország területén több, mint 11%-a (1,02 millió ha) tartozik a gyepművelési ágba, amelyből jelentős helyet foglalnak el az extenzív hasznosítású, takarmánytermő területek. Az extenzív hasznosítás nem zárja ki, hogy a gyepterületen évente több hasznosítás történjen. Kísérletünkben azt vizsgáltuk, hogy milyen hatással van a gyep botanikai összetételére a hasznosítás gyakorisága.

A gyephasználat három típusát (évi 2, 3, 4 hasznosítás) szimuláltuk ugyanazzal a metódussal két termőhelyen, trágyázás nélkül. Az évi 2-szeri hasznosítás egy kései első (június harmadára) és egy őszi kaszálást jelentett. Az évi 3-szori hasznosítás május haviában, július végén és október elején történt növényállomány-felvételezést jelentett. A négyszeri használat májusi, június végi, július végi és október eleji botanikai vizsgálatot jelentett.

Mendén, a telepített, üde fekvésű kaszálón, a növényállomány-felvételezés során zömében 10 alatt volt a fellelt fajok száma. Bőszörön, a száraz fekvésű, természtes gyepen 35-40 növényfajt azonosítottunk.

Az adatok felolgozása során a relatív ökológiai mutatók (Borhidi 1993) közül a relatív hőigény (TB), relatív nitrogénigény (NB) és a szociális magatartási típusok (SBT) értéke megoszlását elemzettük.

A vizsgált két év alapján elmondhatjuk, hogy a 3 hasznosítási variáció közül az évi 3 kaszálás kedvezett leginkább a természetközi növényállomány fenmaradásának, illetve kialakulásának. További vizsgálatok szükségesek a hosszabbítvá hatásuk igazolásához.