Improving grasslands of Agrostis capillaris and Festuca rubra in the Carpathian Mountains of Romania by organic fertilization

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INTRODUCTION

The permanent grassland in Romania is generally situated on degraded, poorly productive lands, having an improper botanical composition, while the obtained yields are low and of poor quality. Balanced fertilization and rational use of fertilizers are basic measures for improving grassland (Elleaesser et al., 2009; Hopkins et al., 1999; Peeters and Kopec, 1996). Organic fertilization and rational use of fertilizers can produce substantial increases of the production and biodiversity and fodder quality improvement (Vintu et al., 2008).

METHODS

This trial was carried out in the mountainous region on Agrostis capillaris and Festuca rubra grassland, where fodder-producing grassland is mainly used for feeding dairy cattle. Organic fertilization was used as an experimental factor; fertilizer rates, varying between 10 and 40 Mg ha⁻¹. The unfermented manure, having a content of 440 mg kg⁻¹ total N, 160 mg kg⁻¹ P, 310 mg kg⁻¹ K and 300 g kg⁻¹ DM, was applied manually in very early spring, at the beginning of grass growth. The vegetation was studied by the geobotanical method by means of a 25 m² vegetation framework. For determining the crude protein, we used the Kjeldahl method. On the grassland made up of Agrostis capillaris and Festuca rubra from Campulung Depression-Suceava County, eight variants of organic fertilization were used. Dominant grasses in hayfields were harvested at the ear formation stage, while determinations were carried out at the first cycle of vegetation. Chemical analysis of sward was carried out on samples taken from the first harvest cycle. The analysed data are the mean values for years 2006-2008.

RESULTS

In grassland, which is made up of Agrostis capillaris and Festuca rubra, 46 species were found, of which 11 were grasses, 8 legumes and 27 species from other botanical families; the dominant species were Agrostis capillaris (19%) and Festuca rubra (7%), followed by Trisetum flavescens (4%), Anthoxanthum odoratum (3%) and Trifolium repens (10%).

Table 1. Influence of fertilization on biodiversity and percentage of main canopy species (%)

<table>
<thead>
<tr>
<th>Species</th>
<th>V1 %</th>
<th>V2 %</th>
<th>V3 %</th>
<th>V4 %</th>
<th>V5 %</th>
<th>V6 %</th>
<th>V7 %</th>
<th>V8 %</th>
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<tbody>
<tr>
<td>Agrostis capillaris</td>
<td>19</td>
<td>13</td>
<td>14</td>
<td>11</td>
<td>10</td>
<td>13</td>
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<tr>
<td>Festuca rubra</td>
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<tr>
<td>Cynosurus cristatus</td>
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<td>5</td>
<td>4</td>
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<td>Anthoxanthum odoratum</td>
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<tr>
<td>Trisetum flavescens</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>6</td>
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<td>37</td>
<td>34</td>
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<td>15</td>
<td>17</td>
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<td>12</td>
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<td>Legumes</td>
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<td>32</td>
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<td>94</td>
<td>98</td>
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<td>99</td>
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<td>37</td>
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The management of permanent grasslands, in terms of usage, type and intensity of fertilization and control method has a great influence on phytocoenotic diversity, on species rate in the structure of vegetation and on dominant species in the canopy. The organic fertilization resulted in changes of the botanical composition, by diminishing the percent of Agrostis capillaris by 5-9% and of Festuca rubra by 3-5% and by increasing the percent of Trisetum flavescens by 1-9%, of Cynosurus cristatus by 1-5%, of Trifolium repens by 2-15% and of Trifolium pratense by 1-7%.

Table 2. Influence of organic fertilization on yield (Mg ha⁻¹ DM), crude protein content (CP) and CP quantity (Kg ha⁻¹) in the fodder obtained from grasslands made up of Agrostis capillaris and Festuca rubra

<table>
<thead>
<tr>
<th>Organic fertilization / Mg ha⁻¹</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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<td>Control</td>
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<tr>
<td>No fertilization</td>
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REFERENCES