To what extent are mountain permanent grasslands different from lowland ones? Results from a study conducted in France

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Permanent grasslands

• Important issue to keep and use permanent grasslands in livestock systems

• Provide evidence about heir joint interest for production and environment

• Mountain / lowland permanent grasslands
  o Higher ecosystem services ?
  o Less productive ?
  o Forage of lower nutritive value ?

• Use data of a large scale study conducted simultaneously in mountain and lowland area
The design of the study

78 farms with more than 50% permanent grasslands (> 10 years) in the forage production area
- Recording of practices
- Analyses of the role of grasslands in the forage system

190 plots selected from 1500 for a survey during 2 years

47 plots in mountain area (> 600 a.s.l)
Pyrénées, Massif Central, Jura and Vosges
The measurements

✓ Botanical composition
  - Botanical inventory in spring 2009

✓ A detailed recording of management practices (cutting, grazing, fertilisation...)

✓ Grass samples in exclosures:
  - 4 samples/year: beginning and late spring, summer and autumn regrowths
  - Biomass production, Functional composition, Nutritive value

1520 samples ➪
## Mountain vs lowland grasslands

<table>
<thead>
<tr>
<th></th>
<th>Mountain</th>
<th>Lowland</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N fertilisation (kg/ha)</td>
<td>52.8 ± 62.8</td>
<td>47.8 ± 55.5</td>
<td>ns</td>
</tr>
<tr>
<td>Grazing Days (LU.days/ha)</td>
<td>194 ± 217</td>
<td>268 ± 214</td>
<td>0.085</td>
</tr>
<tr>
<td>Number of species</td>
<td>31.6 ± 11.5</td>
<td>21.6 ± 6.71</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Legumes (%)</td>
<td>11.2 ± 8.78</td>
<td>6.48 ± 8.09</td>
<td>0.001</td>
</tr>
<tr>
<td>Forbs (%)</td>
<td>14.0 ± 13.0</td>
<td>5.96 ± 7.60</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Functional Type C grasses (%)</td>
<td>16.7 ± 19.5</td>
<td>5.81 ± 8.67</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Biomass production (t/ha)</td>
<td>7.29 ± 2.67</td>
<td>7.07 ± 2.42</td>
<td>ns</td>
</tr>
<tr>
<td>OMD beginning of spring (%)</td>
<td>75.9 ± 3.36</td>
<td>77.9 ± 3.96</td>
<td>0.018</td>
</tr>
<tr>
<td>Mean OMD (%)</td>
<td>68.2 ± 2.31</td>
<td>68.2 ± 3.42</td>
<td>ns</td>
</tr>
<tr>
<td>Mean CP (g/kg DM)</td>
<td>122 ± 13.1</td>
<td>119 ± 19.2</td>
<td>ns</td>
</tr>
</tbody>
</table>
The number of species increases with altitude.
No opposition between number of species and biomass production
High variability within and between grassland types

Mean ± SD

Biomass production (t DM/year)

Grassland types

Mountain  |  Semi-continental  |  Oceanic  |  Coastal

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Conclusion

• Forage production services provided by mountain permanent grasslands are in the range than that of lowlands ones.
• Ecosystem services provided by botanical diversity are of higher value in mountain permanent grasslands.
• Mountain permanent grasslands can combine a good production level with environmental services.

Thanks for your attention
SAVE THE DATE

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https://symposium.inra.fr/isnh2018
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