

## The effect of legume/grass pasture on soil organic carbon

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**Introduction** Soil organic carbon content is an important integral indicator of soil fertility. The extent at which the soil can sequester carbon depends on the nature of agricultural production, land use and soil type (Follet, 2001). More than two thirds of the annual grassland biomass production is allocated to below ground structures and deep humus layers are common in grassland (Körner, 2002). Grasslands differ markedly in species composition, utilisation purpose, fertilisation and this can significantly change their effect on soil organic content (Hassink & Neeteson, 1991). The objective of study was to estimate changes in the soil organic carbon content and C:N ratio after pure grass and mixed swards of legumes and grass at different grazing frequencies.

**Materials and methods** The experiment was conducted in Dotnuva (55°24'N) on a loamy *Cambisol*. Soil pH varied from 6.5 to 7.0, humus content was 2.5-3.2 %, C content 14.5 g/kg, available P 50-80 mg and K 100-150 mg/kg. The experiment involved swards consisting of different legumes and grasses with frequent (F) and less frequent (LF) grazing. Grazing intensity was 2-2.5 cows/ha and the grazing season was 150 d. The *Lolium perenne* swards were with and without nitrogen fertilisation. Soil organic carbon content and C:N ratio were studied in 2001-2002 in the third and fourth year of grassland use. Soil N was determined by the Kjeldahl method and the Ponomariova-Plotnikova-modified Tyurin method was used for the organic carbon content.

**Results** In the soil under different swards and grazing frequency, the content of organic carbon ranged from 15.53-17.83 g/kg (Table 1). The soil organic carbon content varied little during the experimental period in this soil which was rich in organic carbon. The content of organic carbon increased slightly in the soil under legume/grass swards. Grazing frequency of swards did not have any significant effect on the organic soil carbon content. The C:N ratio varied slightly depending on the composition of swards. The C:N ratio was lower with frequent grazing, because the N content of the soil had increased.

**Table 1** The effect of different swards on soil organic carbon content and C:N ratio

Swards (A factor)	Carbon content, g/kg							
	2001 spring		2001 autumn		2002 spring		2002 autumn	
	F <sup>1)</sup>	LF <sup>1)</sup>	F	LF	F	LF	F	LF
<i>Trifolium repens/L. perenne</i>	16.87	16.23	17.43	16.63	17.83	16.63	17.00	16.13
<i>Medicago sativa/ L. perenne/Poa pratensis</i>	16.16	16.07	16.7	16.93	16.93	16.77	15.87	16.53
<i>T. repens/M. sativa/L. perenne</i>	16.63	16.40	16.80	17.46	17.60	17.57	16.30	17.10
<i>L. perenne/ N<sub>0</sub></i>	17.20	15.9	17.60	17.30	17.33	16.93	16.90	16.97
<i>L. perenne/ N<sub>240</sub></i>	16.57	16.07	17.00	17.30	16.60	16.30	17.47	17.07
LSD <sub>05</sub> A factor/ B factor	0.796/ 0.325		0.850/ 0.347		0.783/ 0.320		0.821/ 0.335	
	C:N ratio							
<i>T. repens/L. perenne</i>	10.00	9.54	9.43	9.89	9.72	9.62	9.39	9.85
<i>M. sativa/ L. perenne/P. pratensis</i>	10.50	9.30	9.50	10.07	9.75	9.89	9.14	10.26
<i>T. repens/M. sativa/L. perenne</i>	9.74	9.63	9.57	9.85	9.66	9.96	9.60	9.90
<i>L. perenne/ N<sub>0</sub></i>	9.98	9.59	9.69	10.06	10.11	10.01	9.78	10.07
<i>L. perenne/ N<sub>240</sub></i>	9.89	9.55	9.61	9.91	9.07	9.49	9.59	9.96
LSD <sub>05</sub> A factor/ B factor	0.284/ 0.116		0.182/ 0.074		0.214/ 0.087		0.259/ 0.106	

B factor: F<sup>1)</sup> frequent grazing, 5-6 grazings; LF<sup>1)</sup> less frequent - 4-5 grazings/season

LSD, least significant difference (P < 0.05)

**Conclusions** The soil under grazed swards was rich in organic carbon. A wider C:N ratio was identified in the soil under less frequent grazing.

### References

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