Impact of different levels of inorganic and organic fertilizers on sward production

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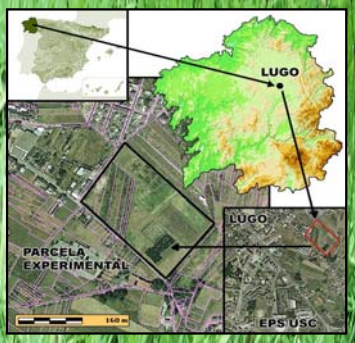
Introduction

Inorganic fertilizer consumption in Spain decreased 29% since 2008 and around 36% within the period 2006-08 (MARM, 2010), respectively. These reductions were caused by the fertilizer prices increase during the last years. For this reason, the use of sewage sludge as fertilizer has been increased in Galicia in the same period, which highlights the importance of optimizing the use of this residue. It was increased in the last years due to the implementation of the European directive 91/271/CEE.



Methods

The study was carried out in Lugo (north-west Spain), at an altitudeof 452 m, latitude of 43º00' N and longitude of 7º32' W.

Two mixtures for pasture were sown:

a) 25 kg *Dactylis glomerata* L. cv 'Artabro' ha^{-1} + 3 kg *Trifolium repens* L. cv 'Huia' ha^{-1}

b) 25 kg *Dactylis glomerata* L. cv 'Cambria' ha^{-1} + 3 kg Trifolium repens L. cv 'Huia' ha^{-1}

Eleven fertilization treatments were applied in experimental plots 2 m x 4 m in a randomised block design with four replicates (Table 1).

Treatments were applied yearly from the start of the year of 1998 to 2008.

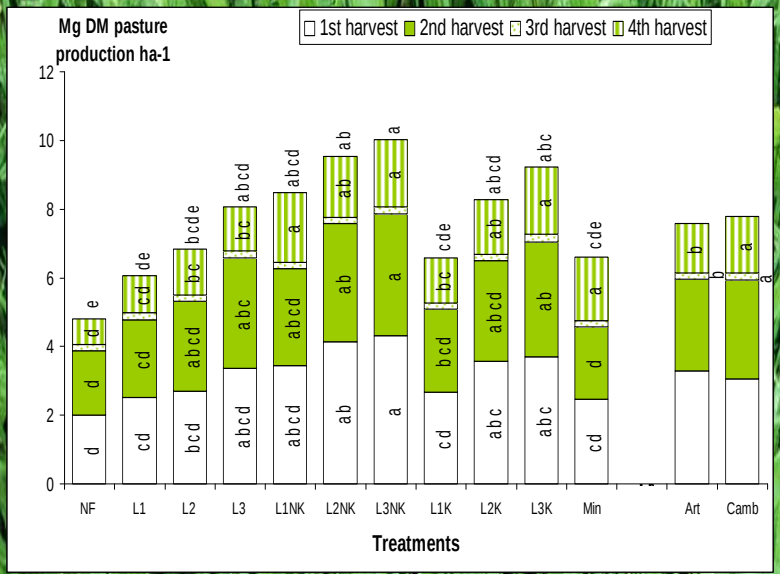
Pasture samples were taken in an area of 1.1 m x 4 m before harvesting. Two harvests were carried out in spring, one in summer and one in autumn 2002. Subsamples were transported to the laboratory, dried at 60ºC during 48 h and subsequently weighted. ANOVA was used for data analysis and Duncan test for mean separation.

	Treatments	Mg ha^{-1} Sewage Sludge	kg ha^{-1} Organic N	kg ha^{-1} Mineral N	kg ha^{-1} K_2O	kg ha^{-1} P_2O_5
1	NF	-		-	-	-
2	L1	5	160	-	-	-
3	L2	10	320	-	-	-
4	L3	15	480	-	-	-
5	L1NK	5	160	40	100	-
6	L2NK	10	320	40	100	-
7	L3NK	15	480	40	100	-
8	L1K	5	160	-	100	-
9	L2K	10	320	-	100	-
10	L3K	15	480	-	100	-
11	Min	-	-	40+40	80	120

Table 1. Fertilization treatments.

pH (H_2O)	% N	% P	% K	% Na	% Ca	% Mg	mg kg^{-1} Mn
7.31	2.79	2.04	0.31	0.07	0.29	0.59	315.03

Table 2. Composition of sewage sludge applied in plots in year 2002.



Results

Treatments have lead to significant differences on biomass production for spring and autumn harvests, but not for summer. Cocksfoot variety treatment only significantly affected pasture production in the third and fourth harvest .

In the spring and autumn harvests, the use of inorganic nitrogen at the start of the year combined with high and medium dose of sewage sludge significantly increased pasture production compared with control.

Biomass production was higher in the third and fourth harvest with Cambria variety of cocksfoot than Artabro variety.

Conclusions

- Sewage sludge inputs benefited pasture more than mineral fertilizer applications.
- At thebeginnig of the season mineral nitrogen is needed to supply pasture nitrogen needs if low doses of sewage sludge are applied.
- The coocksfoot variety Artabro was shown to be more susceptible to summer drought.