

Could the grassland production cost be an argument for biodiversity?



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Aim of the study

Test of the grassland production cost as an argument to maintain species rich meadows

Hypothesis : there is a lower production cost for species rich meadows due to less intensive practices

Study of the links between production costs (per ha and per dry matter tonne), intensification and biodiversity

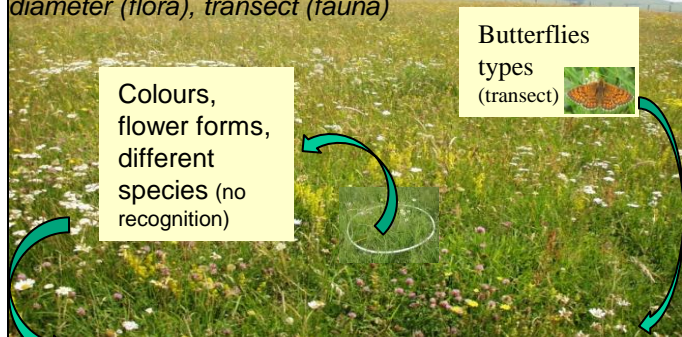
A first study on 29 permanent grasslands

- ♦ Average mountain area (800 m to 1250 m) in Auvergne (centre of France)
- ♦ **14 mown meadows** : 1 or 2 cutting for hay or wrapped balls, sometimes grass topping, quite always autumn grazing, 30 to 120 kg N /ha (maximum 60 kg/ha mineral N)
- ♦ **15 cattle grazed grasslands** : 0.3 to 1.7 LU/ha (mean of 0.9), 0 to 130 kg N /ha (maximum of 30 kg/ha mineral N)

Floristic diversity assessment

A simplified method based on indicators (Orth et al, 2008)

Sampling in each vegetation facies : 10 circles of 1 meter diameter (flora), transect (fauna)



Assessment grids with identification thresholds

→ 5 diversity levels (from 1: low to 5 : high)

Production cost estimation

	Input costs (€ ha ⁻¹ y ⁻¹)	Mechanisation costs (€ ha ⁻¹ y ⁻¹)
Mineral fertiliser	14 to 63 € per 100kg fertiliser	6
Organic fertiliser		35
Harrowing		6
Refusals' cutting		23
Fences setting up and maintenance	5	5
Grazing management		15
First hay cutting *	4.3 to 6.3**	162
Second hay cutting*	4.3 to 6.3**	123
Wrapped balls *	47 to 63 **	211

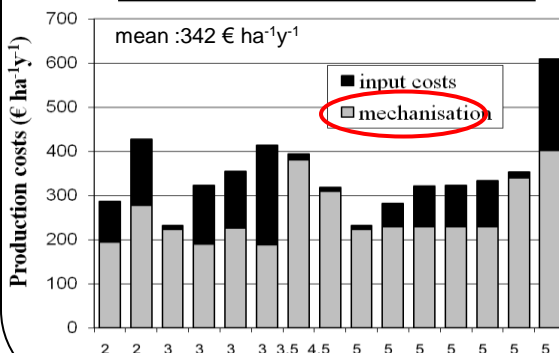
* all included from cutting to transport
 **cost depending on the yield (number of balls)

Yield estimation (Dry Matter tonne / ha) :
 Grazed grassland : 14kgDM/LU/day, Mown : farmers' data

→ cost /ha /year and cost /dry matter tonne /year

RESULT 1 : No obvious relation between production costs per ha and biodiversity levels

Production costs of the mown meadows

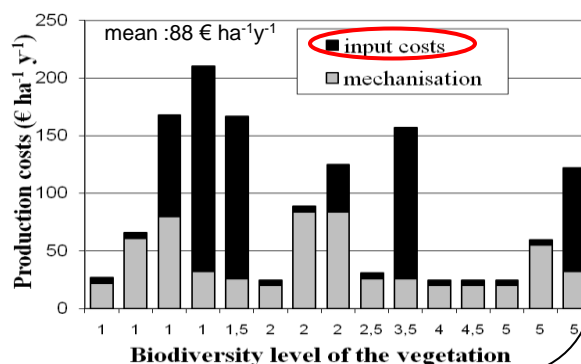


Correlation coefficient between diversity level and cost ha⁻¹ y⁻¹ :

Mown : R = 0
 Grazed : R = - 0.37 (ns)

(ns : not significative)

Production costs of the grazed grasslands



RESULT 2 : Intensification increases costs per ha and yield and reduces DM tonne costs. Extensive management (lowest costs/ha) leads not always to high biodiversity and to the lowest DM tonne costs.

Intensification level	Number of plots	Biodiversity level (1 low to 5 high)	DM Yield (t ha ⁻¹ y ⁻¹)	Production costs (€ ha ⁻¹ y ⁻¹)	Production costs (€ t ⁻¹ y ⁻¹)
MOWN MEADOWS					
Extensive	4	3,2	5,3	280,8	54,1
Medium	4	5	6,7	302,5	46,2
Intensive	6	3,8	6,8	409,5	65,9
Variance analysis		ns	ns	P = 0,05	ns
GRAZED GRASSLANDS					
Extensive	5	3,3	2,4	25,4	9,4
Medium	4	3,2	5,1	93,5	30,5
Intensive	6	1,4	9,3	158,7	17,5
Variance analysis		ns	P=0,0	P=0,0	ns

♦ **Mown** : medium intensification (1cutting, 80-100kgN/ha) has high diversity and the lowest production cost per DM tonne, extensive plots' lowest diversity is due to history (practices evolution)

♦ **Grazed** : extensive grazing has the lowest costs per ha and tonne but only medium diversity level

♦ **Plot location** would improve the cost analyse

Conclusion : The hypothesis is partially validated for grazed grasslands but not for mown meadows (too narrow range of intensification?). Another study on 70 plots in 2010 has shown the same tendencies.