

Effect of maturity type of *Lolium perenne* cultivars on performance of grass-clover mixtures under frequent cutting



Wulfes R.¹ and Taube F.²

¹ University of Applied Sciences, Department of Agriculture, Kiel, Germany

² Christian-Albrechts-University Kiel, Institute of Crop Science and Plant Breeding, Grass and Forage Science/Organic Agriculture, Kiel, Germany



Introduction

Perennial ryegrass (*Lolium perenne* L. (Lp)) is the main companion grass in grass-white clover mixtures in permanent pastures of north Germany. In grass-clover mixtures the differences in phenological development of Lp-varieties can influence the competition between grass and clover. The main aim in this investigation is to quantify the influence of maturity type (early, late, mixture) of Lp-cultivars in grass-white clover mixtures on productivity, forage quality parameters and white clover (*Trifolium repens* L.) compatibility.

Material and methods

Experimental treatments:

- **Lp-maturity type:** - early (cv. ‚Gremie‘, 2n; cv. ‚Bastion‘, 4n; each 50 %)
 - late (cv. ‚Vigor‘, 2n; cv. ‚Condesa‘, 4n; each 50 %)
 - early/late mixture (all cultivars, each 25 %)
- **N-Fertilisation:** 0, 50, 100, 150, 200 kg N ha⁻¹ year⁻¹

The amount of N fertilizer was applied with emphasis on the first part of the vegetation period (50 kg: only to the first cut; 100 kg: 50 kg to each first and second cut; 150 kg: 50 kg to each first, second and third cut; 200 kg: 50 kg to all four cuts)

- **Field trial:** Split plot design with 4 replicates, 1993 – 1995
- **Location:** Ostenfeld, loamy sand site near Kiel, in Schleswig-Holstein, northern Germany
- **Analysed parameters:** Dry matter (DM)-yield, Net energy (NE_L)-yield, NE_L- content, N-yield, crude protein (CP) content
- **Cutting system:** 4 cuts per year

The harvesting dates were adapted to practical conditions to maximize productivity of the swards. First cut with ear emergence of the Lp-varieties, following cuts at a DM stage considered optimum for grazing (1.5 to 2 Mg ha⁻¹)

Results and discussion

	clover content (% of dry matter)				
	0	1x50	2x50	3x50	4x50
Lp-early	32	26	17	6	5
Lp-late	26	20	14	4	4
Lp-early/late	24	22	13	7	4

N-fertilisation (kg ha⁻¹ y⁻¹)

Figure 1: Effect of maturity type of *Lolium perenne* (Lp) on clover content (% of dry matter) in grass-clover mixtures (mean of 3 years)

Table 1: Effect of maturity type of *Lolium perenne* (Lp) on yield and quality parameters of grass-clover mixtures (mean of 3 years and 5 N-levels)

Lp maturity type	DM Mg ha ⁻¹	NE _L MJ kg DM ⁻¹	NE _L GJ ha ⁻¹	CP g kg DM ⁻¹	N kg ha ⁻¹
early	9.00 ^a	6.66 ^a	59.1 ^a	174 ^a	224 ^a
late	8.69 ^b	6.58 ^c	55.8 ^b	169 ^b	197 ^b
early/late	8.90 ^{ab}	6.62 ^b	58.2 ^a	169 ^b	216 ^a
LSD _{0.05}	0.29*	0.03***	1.9***	4*	10.8***

DM = dry matter, NE_L = net energy of lactation, CP = crude protein, N = nitrogen. LSD = least significant difference with $P < 0.05$. Means in the same column with the same superscript letters do not differ at $P < 0.05$.

Compared with the grass-clover mixture with late Lp-varieties, the mixture with early Lp-varieties

- ➔ had on average over three years and five N-levels the highest cutting frequency (4.4 to 3.7 cuts y⁻¹),
- ➔ produced a higher clover content (Figure 1),
- ➔ had on average over all N-levels a significantly higher annual DM-yield (+ 3.5 %), NE_L-yield (+ 5.9 %) and N-yield (+ 13 %) (Table 1),
- ➔ had the highest quality in terms of mean annual NE_L- and CP-content (Table 1).

The effects was especially pronounced at low N-input (Figure 2). In the mixture with the early Lp-varieties the nitrogen fertilisation level had no statistical influence on the yield, whereas with low nitrogen the yield of the late mixtures decreased significantly.

Conclusions

The results reflected the clearly superior performance of grass-white clover mixtures with early maturity types of *Lolium perenne*. These mixtures should be considered in grassland production systems with low nitrogen input.

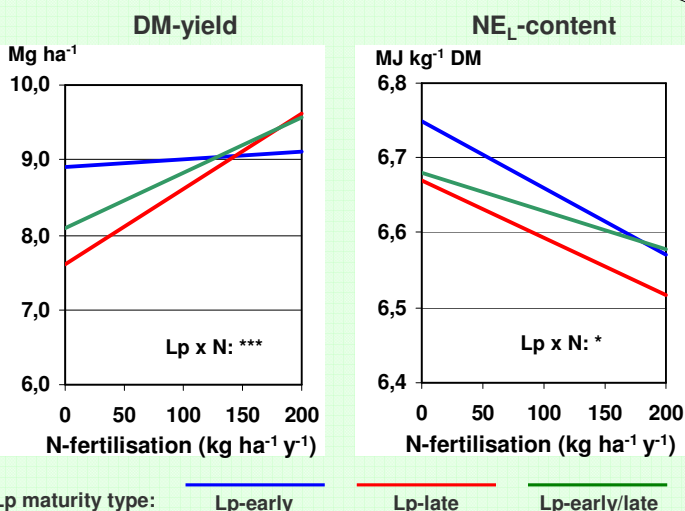


Figure 2: Effect of maturity type of *Lolium perenne* (Lp) and nitrogen fertilisation level (N) on dry matter (DM) yield and net energy (NE_L) content of grass-clover mixtures (mean of 3 years)