

Performance of timothy cultivars in monoculture or in mixtures with meadow fescue in Finland

M. Kari¹ and M. Rinne²

¹Experiment farm of Kesko Agro, Hahkialantie 57, FI-14700 Hauho, Finland, Email: maarit.kari@kesko.fi,

²MTT Agrifood Research Finland, FI-31600 Jokioinen, Finland

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Introduction Timothy (*Phleum pratense*) and meadow fescue (*Festuca pratensis*) are dominating grass species in Nordic countries with severe winters. Dry matter (DM) yield potential, forage quality and winter hardiness are of main interest for commercial cultivars. Further, it is advantageous to take into account the relation between primary growth and regrowth (P/R) DM yield when planning mixtures for different purposes and areas. In the current experiment, three different types of timothy were evaluated: a northern type cv. Jonatan, a southern type cv. Ragnar and an intermediate type cv. Grindstad. In addition, meadow fescue cv. Kasper and mixtures with all timothy cultivars and cv. Kasper were studied.

Materials and methods The trial was carried out in Hauho, Finland (61°N), at the experimental farm of Kesko Agro and sown in May 2000 in monoculture with three replicates for each treatment. N fertilisation was set at 90 kg/ha for primary growth and 80 kg/ha for regrowth. Harvesting dates for primary growth and regrowth, respectively, were June, 18 and August, 29, 2001, June, 10 and August, 1, 2002, and June, 17 and August, 12, 2003. All cultivars were harvested simultaneously at the time of heading in cv. Grindstad. Samples were dried at 60°C for 20 hours and DM yield recorded. Combined samples for the replicates were analysed for digestible organic matter (D-value) and crude protein (CP) by NIRS in the laboratory.

Results The total DM yield of meadow fescue cv. Kasper was lower than that of all timothy cultivars (Table 1). Monoculture timothy gave higher DM yield in both harvests compared to mixtures with meadow fescue. For individual cultivars, cv. Ragnar performed better in monoculture in primary growth, and both cvs. Ragnar and Grindstad in regrowth, than mixed with meadow fescue. In primary growth, the D-value of cv. Kasper was numerically higher than in the timothy cultivars. In regrowth, the variation in D-value was small. The average D-value in primary growth was higher than in regrowth (674 vs 658 g/kg DM) with the current harvesting strategy applied. All the D-values were slightly lower than recommended for silage based milk production in Finland (680-700 g/kg DM). The differences in growth type between the cultivars were estimated as DM produced in primary growth per DM produced in regrowth (P/R). The low value for cv. Kasper describes the typically good regrowth ability of meadow fescue, though total DM yield remained lower than in timothy. Northern type cv. Jonatan and intermediate type cv. Grindstad produced more DM in first harvest than cvs. Ragnar and Kasper. The DM yield decreased significantly with progressing age of the leys. For example, total DM yield was 13398, 10224 and 7545 kg/ha for years 2001, 2002 and 2003, respectively. This demonstrates the decreasing yield potential as the age of the ley increases, but in the present experiment, the amount of decline is confounded with varying annual weather conditions.

Conclusions Different types of timothy differ in yield potential. Southern and intermediate types of timothy had positive effects on regrowth DM yield under climatic conditions of Southern Finland. Mixtures with meadow fescue are considerable options for practical farming despite poorer performance compared to monocultures of timothy in the present trial. Mixed leys with components with different potential for yield, regrowth, winter hardiness and resistance to stress are likely to stabilise annual variation in forage production.

Table 1 Performance of timothy cultivars Grindstad (G), Jonatan (J) and Ragnar (R) as monoculture or as mixtures with meadow fescue cv. Kasper (K) in primary growth and in regrowth in a two cut system over three years in Finland

	G	J	R	K	G+K	J+K	R+K	SEM	C1	C2	C3	C4	C5
Primary growth (P)													
DM yield (kg/ha)	6188	5715	5595	4309	5934	5554	5132	144.5	***	*	*	**	
CP yield (kg/ha)	549	519	456	408	501	503	452	11.8	***	*	o	***	***
D-value (g/kg DM)	672	663	671	693	666	675	675	-					
Regrowth (R)													
DM yield (kg/ha)	5683	4459	5492	4556	4928	4390	4790	139.6	***	***	***		***
CP yield (kg/ha)	301	302	341	364	312	294	365	11.3	***			*	*
D-value (g/kg DM)	658	672	654	646	656	668	654	-					
DM yield (P/R)	1.122	1.333	1.031	0.914	1.205	1.281	1.072	0.0373	***		***	o	***

C1=timothy vs meadow fescue, C2=Monoculture timothy vs mixtures, C3=G vs J, C4=G vs R, C5=J vs R