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Growth and development in cultivars of *Phleum pratense* and *Lolium perenne* during winter

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Key words : timothy, perennial ryegrass, growth, biomass, carbohydrates

Introduction More variable winter climate with frequent fluctuations between frost and mild weather are expected in Norway (RegClim 2005). The aim of the study was to provide a detailed picture of growth and development of contrasting cultivars (cvs.) of timothy (*Phleum pratense* L.) and perennial ryegrass (*Lolium perenne* L.) during winter as part of a climate change study.

Materials and methods Cultivars of timothy (Engmo, Grindstad, Jauniai, S48) and perennial ryegrass (Riikka, Gunne, Veja, S23), all of North European origin, were established on a coastal location (Fureneset, 61°N, 5.04°E, 30 m a.s.l.) in Norway. Plants were established in May 2005 in 101 black polyethylene bags filled with a fertilized sand-peat mixture, 10 seedlings per bag and placed in the field, and 20 bags per m². Destructive sampling was performed on five occasions from 20 October 2005 to 21 April 2006 for determination of above ground biomass, tiller density and leaf area, all dried at 60°C for 48 h (dw). Total carbohydrate content was analyzed according to Ashwell (1957) and LT50 values were calculated from freezing tests (Höglind et al., 2006).

Results Distinct differences between ryegrass and timothy during winter were observed (Figure 1). Lowest LT50 values were found in January for ryegrass (-8.6°C) and in March for timothy (-14.2°C). In April the observed LT50 values were -6.5°C and -8.6°C for ryegrass and timothy, respectively. The autumn was very wet, with frequent rain, giving the plants poor hardening conditions. Mid-winter was mild prior to a cold period in late winter and spring (Table 1).

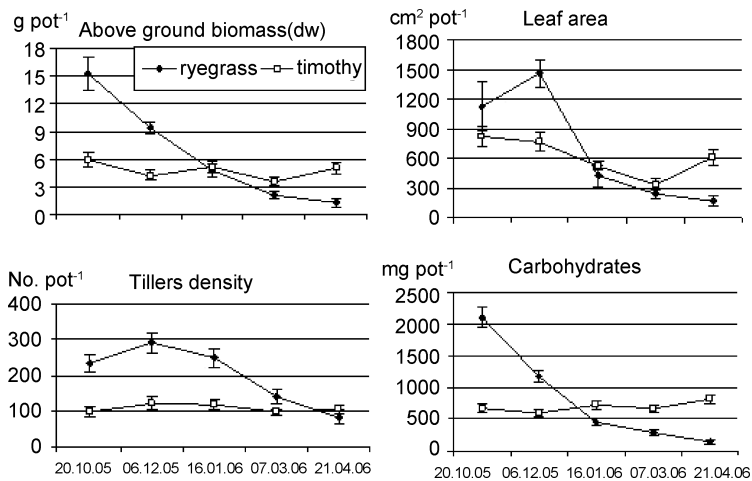


Figure 1 Above ground biomass, tiller density, leaf area and carbohydrates during the period 20 Oct. 2005 to 21 April 2006.

Table 1 Mean monthly temperatures (°C) and precipitation (mm) from on-location weather station.

Month (2005-06)	Air temp.	Precip.
May	8.3	154
June	11.3	158p
July	15.3	101
August	13.3	218
Sept.	12.0	411
Oct.	10.3	210
Nov.	5.8	418
Dec.	3.0	187
January	2.9	201
February	2.8	129
March	-0.1	57
April	5.2	169

Conclusions A high above ground biomass and tiller production in ryegrass compared to timothy during the autumn levelled out towards the spring due to a rapid loss of ryegrass tillers during winter. The reduction also caused a considerable reduction in carbohydrates per unit area in ryegrass. Timothy kept most of its above ground biomass with slightly increased carbohydrate content, and achieved a higher level of frost tolerance.

References

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