Managing the reproductive development of grasses by grazing practices

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Introduction Grazing natural grassland communities is necessary for both productive (feeding herbivores) and environmental (maintenance of open landscapes) objectives. Management guidelines should take into account the functional diversity of plant species between and within grassland communities. The management of the heading stage of grasses by grazing is an important tool to maintain acceptable forage quality and to avoid the seeding of low-valued species. The heading stage should be managed even in extensive systems and this needs a good knowledge of the phenological development of dominant species. In this work we illustrate the approach through the study of the development of four contrasting grasses and analysing the consequences for grazing management. This work concerned only diversity of the plant components of the grassland ecosystem.

Materials and methods Three native populations of *Lolium perenne* (*Lp*), *Dactylis glomerata* (*Dg*) and *Bromus hordeaceus* (*Bh*), components of a natural grassland and an improved variety of *L. perenne* (Ohio) growing in a sown grassland were studied in grassland of the Limousin area (centre-west of the Massif Central in France, 900 m a.s.l.). From 21 April to 28 May, 20 reproductive tillers (10 tillers x 2 transects) of each species were harvested every 7 days. Both, plant and apex height from the soil level were recorded. The position of apices within the tillers was observed by dissection. Heading development was expressed on a thermal time basis (base temperature 0°C). After apex ablation these species do not have a further reproductive cycle (Gillet, 1980).

Results Stem elongation was very regular within the grass populations but highly variable between them. This would preclude the use of the sward height as an indicator to manage these complex communities (Figures 1a and 1b). Stem elongation was similar in *Dg* and *Lp* up to an apical height of 8 cm (a threshold height for animal intake), whereas *Bh* reached this height 12 days earlier. On the other hand, *Lp* Ohio, which was selected for its late development, attained it 16 days later. The relationship between plant and apex height was specific to grass populations. Nevertheless, whatever the studied material, for an apex height of about 8 cm the plant height was always too high (from 25 to 45 cm) to allow efficient grazing in the first cycle of a rotational system and the proportion of apices removed by grazing will be very different between species and varieties. Thus, 80% of apices reached the 8 cm threshold at 453, 533, 513, 666 degree days for *Bh*, *Lp*, *Dg* and Ohio (Figure 1c).

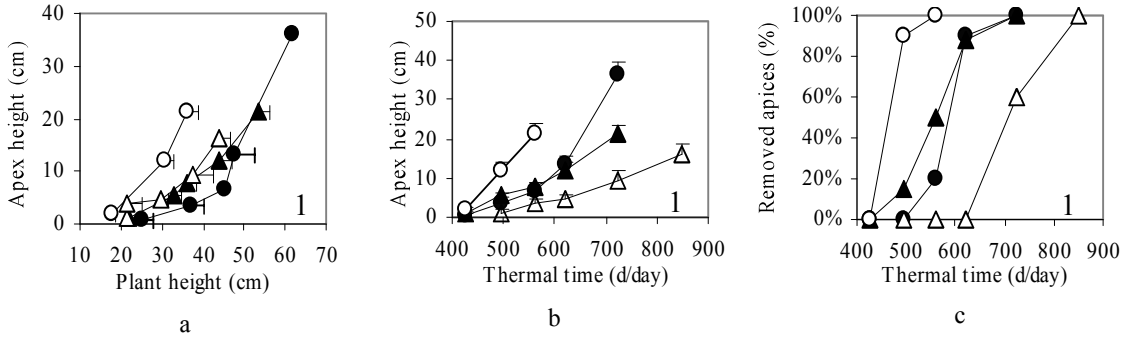

Figure 1 Height of reproductive apices of three native grasses (○: *Bh*; ▲: *Lp*; ●: *Dg*) and a commercial variety of *L. perenne* (△ : Ohio) related to the plant height (1a) and the thermal time (1b) and differences in values of thermal time at which 80% of the apices of each material could be removed by grazing (1 c)

Conclusions These results indicate that the control of heading would not be feasible at the time of the first grazing cycle, because many apices will not be removed. In this case, an early first grazing could be recommended in order to reduce plant height and thus allows a maximal removal of apices during the following grazing cycle. We also showed that good knowledge of the functional diversity existing within and between grasslands could be used to decide the best method of managing the reproductive cycle of grasses by grazing.

References

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