

Varietal differences in perennial ryegrass for fructan metabolism and their relationship to grazing tolerance

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Introduction Perennial ryegrass (*Lolium perenne* L.) is the most important grass in Europe; it often is defoliated. The link between fructan metabolism and defoliation tolerance has been studied in 2 *Lolium perenne* varieties, Aurora (high sugar perennial) and Perma (low-to-normal sugar perennial) (Turner *et al.*, 2002).

Materials and methods The 2 *Lolium perenne* varieties were sown separately and were grown hydroponically in controlled environment for 11wk before being cut 4cm above ground. They were defoliated again 4, 8, 13 and 18d later in order to deplete the carbohydrate reserves. Leaf growth, fructan content, fructan synthesizing and degrading enzyme activities (1-SST and FEH, respectively) were measured (Morvan-Bertrand *et al.*, 2001).

Results Aurora fructan level was higher than that of Perma in leaf sheaths and elongating leaf bases. It fell after defoliation (data not shown). Defoliations every 4-5d markedly decreased regrowth for both varieties, but regrowth was always higher for Aurora than for Perma (Figure 1). Activity of 1-SST fell strongly in leaf tissues of both varieties after the first defoliation (Figure 2). It fell thereafter or remained constant at a low level. FEH activity rose in both leaf tissues of Aurora only after the first defoliation but it kept rising during the following regrowth in Perma, so that FEH activity in Perma was higher than in Aurora.

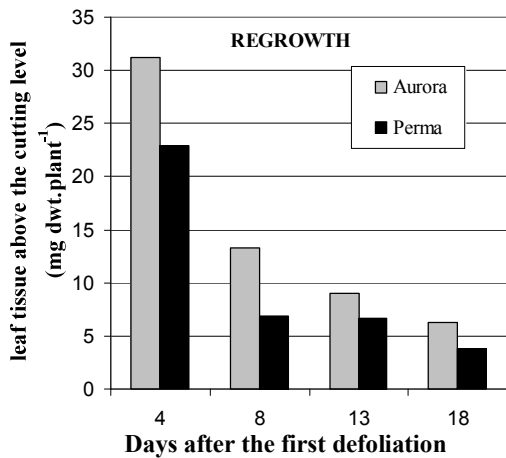


Figure 1 Regrowth of ryegrass after four successive defoliations at day 0, 4, 8 and 13

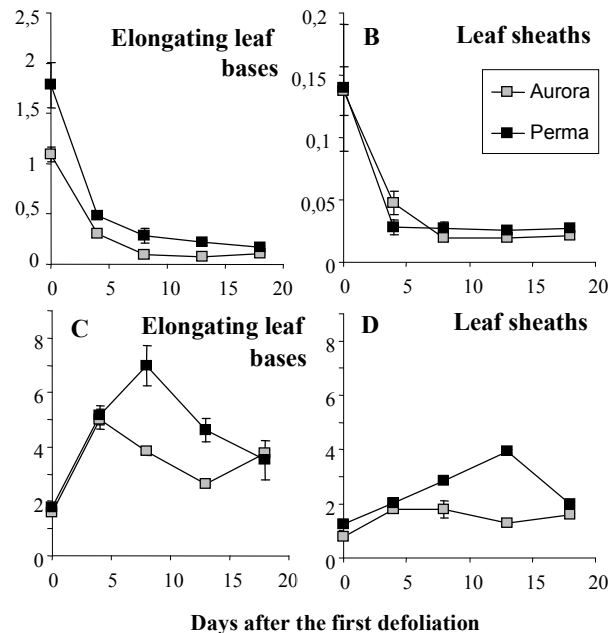


Figure 2 1-SST (A, B) and FEH (C, D) activities (nkat.g⁻¹ FW) in elongating leaf bases and in leaf sheaths of ryegrass after four successive defoliations at day 0, 4, 8 and 13.

Conclusions Based on leaf dry matter production after repeated defoliations, Aurora is more tolerant to defoliation than Perma. This was attributed to the initial reserve carbohydrate, namely fructans, which was higher in Aurora than in Perma. However, the use of fructans is not related to the FEH activity measured *in vitro* which is often higher in Perma than in Aurora and which increased more in Perma than in Aurora in response to repeated defoliations.

References

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