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Leaf morphogenesis as a basis for developing defoliation management strategies in multispecies plant communities of the Flooding Pampa (Argentina)

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Introduction The time of full expansion of the maximum number of leaves per tiller is considered an indicator of the optimal time between successive defoliations in terms of DM production, physiological status and efficiency of herbage utilisation (Lemaire and Agnusdei, 2000). The leaf morphogenesis of three temperate grasses, two native perennials [*Hordeum stenostachys* (Hs), *Stipa neesiana* (Sn)] and one naturalised annual [*Lolium multiflorum* (Lm)] under natural field conditions was studied. The information was used to simulate the accumulated net leaf length per tiller (ANLL) under different defoliation regimes after complete defoliations.

Materials and methods The study was conducted in a natural grassland (37°45' S lat. and 58°18' W long.) temporarily excluded from cattle. Leaf number, turnover and elongation were measured in marked tillers during 2 years in five periods that covered a wide range of mean air temperatures. Leaf appearance and leaf elongation rates were related with mean air temperature (LER-temp).

Results and discussion Estimated phyllochrons were 196 ± 12 , 147 ± 9 y $345 \pm 41^\circ\text{C day}$ for Hs, Lm and Sn, respectively. Lineal functions were fitted for LER-temp, Lm having the highest slope as compared to Hs and Sn. The functions were supported by closed to 1 observed / estimated final leaf length ratios (according to Lemaire and Chapman, 1996). The simulations of ANLL were performed at the own leaf life span of the species and at *S. neesiana* rhythm (slowest leaf turnover). They indicate that extending the defoliation interval in order to match Sn leaf turnover would considerably reduce the potential harvestable forage of Hs and Lm (around 0.40 in blade length). Results encompass important implications for the grazing management of multispecies vegetation, emphasizing the relevance of the morphogenetical heterogeneity of coexisting species as a key and unavoidable factor to handle when an acceptable compromise between herbage utilisation efficiency and sustainability of plant communities is desired.

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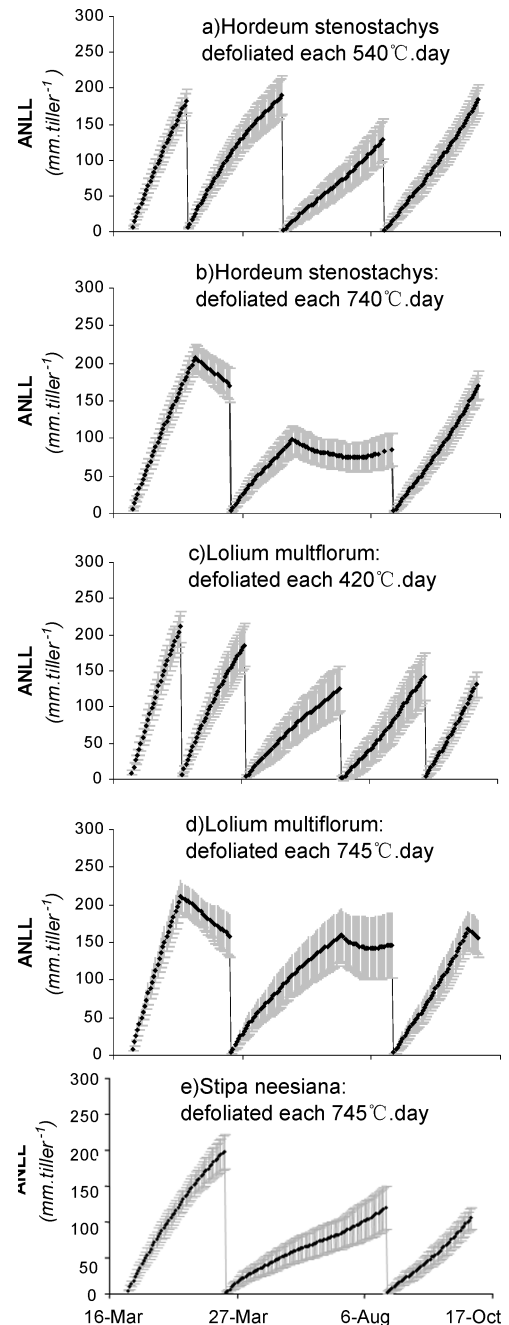


Figure 1 Simulated net leaf length per tiller (mm, ANLL).