Controls of seedling recruitment of annual species in temperate perennial pastures

P . Cornaglia , M .P . Clavijo , H . Harkes and A . , Ayala Torales
Cátedra de Forrajicultura . Facultad de Agronomía . Universidad de Buenos Aires . Argentina . E-mail : cornagli@ agro . uba .ar

Key words : emergence , dormancy , bromegrass , red clover , production stability

Introduction Temperate pastures are characterized by low growth rates during the winter . The incorporation of annual species in the mixture gives the opportunity to balance the distribution of the forage allowance through the year . However , successfully seedling recruitment every year depends upon the environmental conditions which : (1) allows the reproduction of the mother plant at the end of the growing season (Forcella , 2000) and (2) breaks the dormancy of the seeds (Benech et al . , 2000) . The objective of this work was to evaluate the patterns of seedling recruitment of two annual species , brome grass (*Bromus catharticus)* and red clover (*Trifolium pratense*) , under different environmental conditions .

Materials and methods We registered the emergence of brome grass and red clover seedlings in two temperate pastures during 2005-2006 in a dairy farm located at General Las Heras , Buenos Aires province , Argentina (34°59′S ; 58°50′W) . The grazing regime was low intensity and high frequency . Density of emerged seedlings of the two species (seedlings/m^2) was estimated by the frequency grid method from Vogel and Masters (2001) .We also registered the distribution of rainfall and the air temperatures during the period of evaluation . We analyzed the results through the repeated measures method (Manova) .

Results and discussion Seedling recruitment of brome grass occurred since April to June in both years (80%-90%) [Figure 1 (a)] . However , the total density of seedlings recruited differed between years : it was significantly higher in 2005 compared with 2006 ($p < 0.001$) . We propose two possible explanations : the first is associated with moisture requirements of posmaturity in brome grass .Whereas seeds postmatured under drought conditions , can emerge under a dense canopy , seeds posmatured under high moisture conditions need lighted gaps for successful emergence (Mollard et al . , 2007) . Differences between rainfall in summer 2005 (regular) and summer 2006 (+50%) could make the differencs about this subject . The second is associated with rainfall during the fall , necessary for emergence after the dormancy break . Again , both years differ by 50% in fall rainfall . Seedling recruitment of red clover was less than that of brome grass but it occurred along the whole year , and it was less significant in 2006 than in 2005 ($p < 0.001$) [Figure 1(b)] . Legumes produce hard seeds and the hardness loss is regulated by temperature whereas the survival of the seedlings is influenced by moisture conditions (Frame et al . , 1998) .

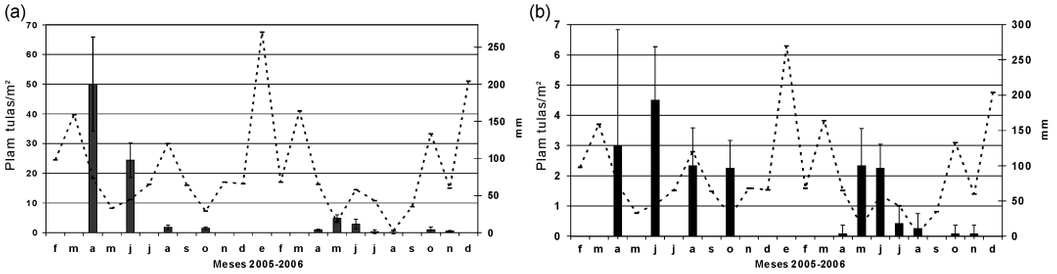

Figure 1 *Seedling density of (a) brome grass and (b) red clover (seedling/m^2) . Vertical lines show standard deviation . Dotted lines show monthly rainfall .*

Conclusion Brome grass and red clover showed different patterns of seedling recruitment . The main factor that explained the trend of seedling recruitment observed in brome grass was the occurrence of rainfall previous and during the period of emergence . Red clover didn't show a specific pattern . Knowledge of these factors is required for defining strategies that guarantee the stability of forage production during the useful life of the pasture .

References

Benech ,R . ,Sánchez ,R . ,Forcella ,F . ,Kruk ,B . and Ghersa ,C . ,(2000) . Environmental control of dormancy in weed soil seed banks . *Field Crops Research* 67 , 123-129 .

Frame , J . , Chalton , J . and Laidlaw , A . , (1998) . Temperate Forage Legumes . Wallingtonford : CAB Intenational .

Forcella ,F . ,Benech ,R . ,Sánchez R . and Ghersa ,C . , (2000) . Modeling seedling emergence . *Field Crops Research* 67 , 123-129 .

Mollard ,F . ,Insausti ,P . and Sánchez ,R . , (2007) . Flooding induces secondary dormancy in *Setaria parviflora* seeds . *Seed Science Res* . 17 , 55-62 .

Vogel , K . , Masters , R . , 2001 . Frequency grid—a simple tool for measuring grassland establishment . *J . Range Manage* . 54 , 653-655 .