Autumn root reserves of lucerne affected shoot yields during the following spring

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Introduction Frequent grazing affects shoot yield of lucerne (*Medicago sativa* L.) by limiting radiation interception (Teixeira *et al.*, 2005b) and the accumulation of endogenous reserves (C and N) in perennial storage organs like crowns and taproots (Teixeira *et al.*, 2005a). In temperate regions, the impact of low level of perennial reserves is particularly evident during early-spring, when lucerne regrowth resumes after an overwintering period. The analysis of lucerne yield can be fragmented into its yield components of plant population, shoots per plant and yield per shoot (Volenec *et al.*, 1987). The objective of this research was to quantify the impact of limiting levels of perennial reserves, caused by frequent defoliations, on lucerne early-spring yield and determine the sensitivity of yield components to treatments.

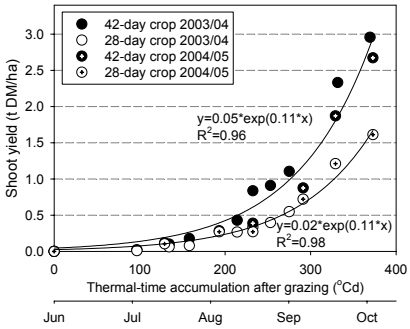

Figure 1 Shoot yield in early spring

Materials and methods A two year old fully irrigated 'Kaituna' lucerne crop was subjected to 28 or 42-day grazing rotations from 12 June 02 to 14 June 04 to induce different levels of crown and taproot biomass. The experiment was conducted at Lincoln University, NZ (43°38'S and 172°28'E) in a randomized complete block design with four replicates. In the autumn of 2003, the total biomass and N content of taproots (300 mm depth) was on average 33% and 20% lower for the 28-day crop than the 42-day crop, respectively (Teixeira *et al.*, 2005a; Teixeira *et al.*, 2005b). During the two early-spring regrowths of the experimental period, shoot yield and yield components were measured weekly.

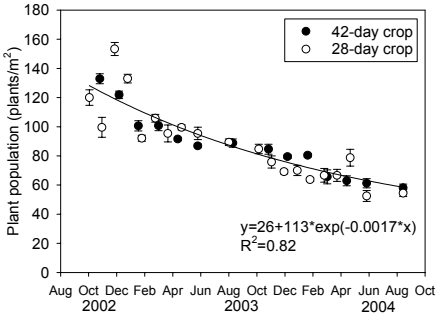

Figure 2 Plant population

Results Shoot-yield in early-spring regrowth was reduced ($P<0.05$) by 45% in the 28-day crop (Figure 1). There was a similar decrease in plant population in both treatments throughout the experimental period from ~130 to 60 plants/m^2 (Figure 2). Maximum shoot numbers were constant (~700 shoots/m^2) due to an increased shoots per plant (Figure 3). Differences in shoot yield were mostly explained (R^2=0.98) by the yield per shoot component.

Conclusions The weight of each individual shoot was the yield component mainly affected by differences in the biomass and N content of lucerne crowns and taproots. Plant population was unaffected by treatments and stem population was maintained through an increase in shoots per plant. The implication is that frequent defoliations reduced the accumulation of C and N in lucerne crown and taproot (Teixeira *et al.*, 2005a). This may then limit canopy expansion and light interception during early-spring regrowth (Teixeira *et al.*, 2005b) reducing lucerne yield through a slower growth of each individual shoot.

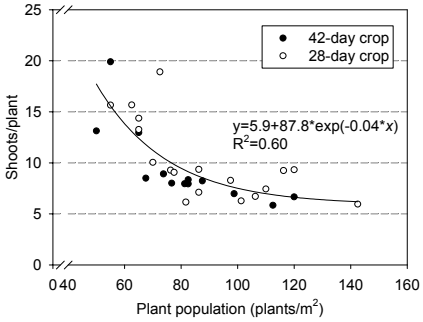

Figure 3 Shoots per plant in relation to plant population

References

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