Influence of seeding systems on annual ryegrass (*Lolium rigidum*) seedling recruitment and competitive interactions with lentil (*Lens culinaris*)

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**Summary**  The influence of seeding systems on annual ryegrass (*Lolium rigidum* Gaudin) recruitment and competitive interactions with lentil (*Lens culinaris*) was examined in a field experiment carried out at Minlaton, South Australia. Ryegrass seedling recruitment from the seed-bank was similar and unaffected by the seeding system (P = 0.294). Average seedling recruitment ranged from 39% for the high soil disturbance full cut system (10 cm wide shear) to 56% for lower disturbance rippled coulter disc. Cumulative seedling recruitment in undisturbed control plots (unsown) was significantly (P < 0.05) lower (17%) than plots sown with a low soil disturbance disc system (44%). Soil cores taken from these plots, once recruitment had ceased in August, showed absence of viable ryegrass seeds, indicating predation as the likely cause of low seedling establishment in this treatment.

Ryegrass spike production increased with its density in a hyperbolic fashion reaching an asymptote at around 800 plants m$^2$. The slopes of the relationship between ryegrass density and spike production for each of the seeding systems were nearly identical, which suggests that the growth of ryegrass and its competitiveness with the lentil crop was unaffected by the seeding system. Furthermore, lentil yield was unaffected by seeding system (P = 0.131) but declined exponentially with increasing ryegrass density (r$^2$ = 0.92). The extent of yield loss exhibited by lentils under low weed burdens was considerable, with yield losses of around 20% at 25 ryegrass plants m$^2$. Yield losses of this magnitude at low weed densities are indicative of the poor ability of lentils to compete with weeds and highlights the need for more competitive grain legume crops in southern Australia.  

**Keywords**  Annual ryegrass, seedling recruitment, seeding systems, competitive interactions, lentil.