Imbibition as a factor affecting germination in subterranean clover (Trifolium subterraneum)

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The rapid germination of subterranean clover seed gives this species one of its main advantages as a successful pasture plant. However, although germination can be rapid, establishment percentages are often extremely low in clover swards, particularly when pastures are seeded aerially. The possibility of improving such a situation could be enhanced if all the factors which influence germination were understood. One of these factors is the rate at which the clover seed can imbibe water.

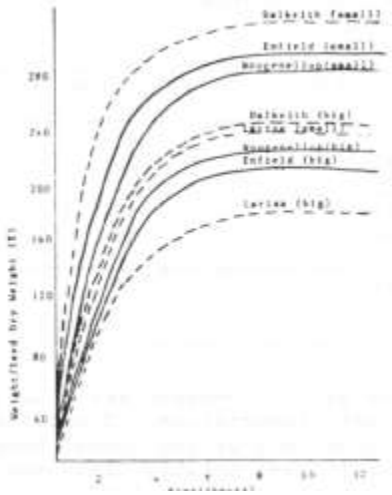
Method

An experiment was conducted to investigate the rate of subclover imbibition using four clover cultivars:- Woogenellup, Dalkeith, Larisa and Enfield. The seed of each was size graded into two classes, scarified and immersed in aeriated water at 20?C(1). Changes in moisture content (percentage of oven dry weight) were determined by removing and weighing samples at hourly intervals.

Results

Observations showed that the smallest seeds of each cultivar imbibed the greatest weight of water to seed dry weight, and did so more rapidly than larger seeds, therefore germinating earlier. The seed size difference between cultivars produced the same effect (Figure 1 and Table 1). There was no significant difference in seed size between Dalkeith big, Woogenellup big and Larisa small or between Enfield small and Woogenellup small.

Figure 1.Moisture Imbibed (%) at 20?C Table 1.Average Seed Weight (g/seed)



Cultivar	Size Class	
	Big (>4 mm)	Small (<4 mm)
Woogenellup	0.0125	0.0086
Larisa	0.0151	0.0104
Enfield	0.0098	0.0066
Dalkeith	0.0100	0.0057

Discussion

Many researchers have studied seed size effects in subterranean clover and on the whole it is difficult to demonstrate significant plant differences due to seed size. Davidson and Donald(2) put forward a theory that delayed germination of smaller seeds resulted in a plant being smaller than its neighbours thus being subjected to reduced light intensity in a sward, which leads to plant death. This experiment suggests that it is the smaller seeded cultivars that have the ability to germinate more rapidly provided 011 seed is soft. While the importance of germination rate as factor in establishment is not unequivocal(1), rapidity of

germination and therefore early establishment is essential for the species to gain an initial advantage in a competitive mixed pasture situation.