

Another good audience turned out to hear another international speaker, **Dr Jan Bokdam** of Wageningen. They were not disappointed. Dr Bokdam used his studies on the dynamics of successional grassland-heathland-forest ecosystems in the Netherlands to highlight the co-evolution and co-dependence of plants and herbivores, and open our eyes to the wider picture of a complete landscape. He showed how the grasslands soon revert to heath land and then to forest when the grazing animals are excluded.

But, more than that, grazing the grasslands encourages succession, with wild cows recycling nutrients by depositing dung in the shelter of the forest. When this nutrient depletion lowers grass production the cows look for fresh pastures. The lowered grazing intensity then encourages the invasion of less palatable heaths (*Calluna vulgaris*, *Erica tetralix*) along with pine (*Pinus sylvestris*) and silver birch (*Betula pendula*). These, plus thorny briar rose and hawthorn act as shelter for the more palatable forest species such as oaks (*Quercus* sp.) and beeches (*Fagus* sp.).

As the resultant forest ages, cracks begin to appear. Browsing and grazing herbivores open up the canopy, suppress the growth of shrubs and forbs (tall herbs) and deposit dung laden with fertiliser and grass seed. So whenever a big tree falls over and lets in light the conditions are right for a grassy clearing to form and thus start again the well-studied European resource-mediated successional grazing cycle (RSGC).

In New Zealand the situation is a little different. Our flora co-evolved with avian herbivores, now mostly extinct and replaced by a mixed assemblage of mammalian grazers and browsers. Over the summer Dr Bokdam collected dung from a range of these, including cattle, sheep, wild goats & pigs, fallow & red deer, rabbits and hares, (but not possums). His growth experiments in the Botany Department glasshouse have produced thousands of seedlings and show that, as in Europe, the large grazers and browsers disperse mainly viable introduced grass seeds in their dung. The goat droppings grew more native plants, dicots as well as monocots, while the dung of the omnivorous boar was notable for the number of kanuka, *Kunzea ericoides*, seedlings it produced.

An interesting aside - in the Netherlands, as in New Zealand, wilding pine enthusiasts uproot invading pines to preserve grasslands. They perform the same function, perhaps, as the elephants that roamed Europe in the inter-glacial period.

The burning question remains. How can we, here in New Zealand, best replace our lost herbivore assemblage to ensure a more balanced ecosystem?

Thank you, Jan, for sharing such thought-provoking research.

#### Reference

Bokdam, J. (2003) Nature conservation and grazing management. Free-ranging cattle as a driving force for cyclic vegetation succession. PhD thesis. Wageningen University, Wageningen, The Netherlands.

(Dr Bokdam has kindly donated a copy of his thesis to the Department of Botany library.-ed)