



What's Happening in... Ecology & Conservation

One invasive European plant species changes an entire ecosystem in New Zealand

Arthur Broadbent, a PhD student in the Plant and Soil Ecology group at Lancaster Environment Centre, explains the devastating effects one invasive shrub species has on native biodiversity in New Zealand grasslands.

Ecosystems are being rapidly altered by human activities all over the planet, including the introduction of new species. Arrival of "invasive alien species" has increased dramatically worldwide since the 1950s, due to growth in transport and trade. This year the EU introduced legislation to stem the influx of invasive species, after their economic costs were estimated at €12 billion annually. Examples here in the UK include Japanese knotweed, which can damage man-made infrastructure, and grey squirrels, which have displaced native red squirrels.

New Zealand has experienced some of the highest levels of biological invasion in the world; almost half of the plant species found there are non-native. Many of the most invasive are European species brought over by British settlers. My research group has partnered with Landcare Research, an environmental government research institute in New Zealand, to investigate how invasive European plant species are impacting native ecosystems in New Zealand. Part of this work is looking at how Scotch broom (a shrub native to the UK) impacts biodiversity and nutrient cycling in the high conservation value tussock grasslands it invades in New Zealand. We conducted fieldwork in remote areas of the Southern Alps in Canterbury, New Zealand, which included collecting soil and plant material. This was analysed in the lab and used in experiments to determine how the ecosystem was changing in response to broom invasion. We found that as the density of broom increases, so too does the mineralisation of nitrogen in the soil, resulting in more nitrogen being available to plants. While this may seem like a benefit, it actually facilitates the spread of invasive grasses, such as common bent (another UK native), which appear to be better adapted to the higher soil nitrogen availability than native New Zealand grasses. Once broom reaches a high population density, even if it is removed, its legacy of increased soil nitrogen mineralisation persists and endemic native species do not recover. As a result, the entire ecosystem shifts from biodiverse native tussock grassland to a species-poor, non-native ecosystem. We therefore advise removing broom when it is still at low density, wherever possible.



Scotch broom growing in native tussock grasslands in St. James Conservation Area, New Zealand



Invasive grasses common bent and sweet vernal grass growing among native species near Lake Tekapo, New Zealand

For more details about the reports above or about Ecology, Conservation and Environmental Biology courses on offer at Lancaster University please contact the Biology Admissions Staff,

**Lancaster Environment Centre,
Lancaster University, LA1 4YQ, UK**

Email: lec.ug@lancaster.ac.uk

or see our website: www.lancaster.ac.uk/lec