

DAN WATKINS SCHOLARSHIP IN WEED SCIENCE

Dan Watkins was one of the founders of the Ivon Watkins Ltd herbicide company, based in New Plymouth, which later became Ivon Watkins Dow and is now Dow AgroSciences. He was a leading figure in the early weed science research arena within New Zealand.

Dan Watkins was a founder of the New Zealand Weeds conference, forerunner of the New Zealand Plant Protection Society. He was also a member of the New Zealand National Research Council and was involved with other scientific bodies. This scholarship has been set up and financed by Dr George Mason, one of the founders of Taranaki Nuchem (now Zelam Limited), in memory of Dan Watkins and to recognise his contribution to weed science within New Zealand.

Kiri Joy Cutting is the recipient of the 2013/14 Dan Watkins Research Scholarship in Weed Science. Kiri is a 1st year PhD student at the University of Waikato and her research title is “Urban Restoration Ecology: Investigating enrichment planting to manage monocultures of the weed *Tradescantia fluminensis*”.

Kiri’s research involves investigating ways to reduce the prevalence and negative impacts of *Tradescantia fluminensis* (Wandering Jew) Commelinaceae. This weed is native to South America and has become an important weed of natural areas (Esler 1962; Kelly & Skipworth 1984b; Fowler et al. 2013). No insects or pathogens in NZ are known to use *T. fluminensis* (Fowler et al. 2013) and consequently the plant displays the monocultures and heightened competitive qualities typical under enemy escape (Standish et al. 2001). It is known to invade light gaps in degraded forests and suppress regeneration of native plants (Esler 1962; Kelly & Skipworth 1984a). Research has shown there is an exponential decrease in native seedling richness and biomass as *T. fluminensis* biomass increases (Standish et al. 2001). As more is learned, expected time-lag effects of *T. fluminensis* are becoming more serious. Biological control agents have been recently released, but establishment status is unknown (Fowler et al. 2013). Even if effective, biocontrol alone often does not provide ecological recovery without associated re-vegetation (Cutting & Hough-Goldstein 2013).

Kiri’s goal is to research field management techniques for reducing *T. fluminensis* in the urban setting. This should be possible through both top-down and bottom-up manipulation. Top-down manipulation will entail enrichment plantings of important native late-successional canopy tree seedlings (*Beilschmiedia tawa*) old enough to provide resource competition through shading and water uptake. Seedling presence, associated with weeding and carbon supplements (in a full factorial experimental design), will also alter below-ground nutrient cycling, forming bottom-up pressures.

The bottom-up aspect is important too because it has been shown that *T. fluminensis* has a high relative growth rate in the presence of ample nitrogen, allowing it to outcompete other plants, even congeners (Burns 2004). We know that *T. fluminensis* alters soil nutrient dynamics by speeding up nitrogen cycling (Standish 2001). Slowing such nutrient cycles may help in restoration of native plants (Kulmatiski et al. 2006). Carbon supplementation should indirectly limit weed growth via reduced nitrogen availability. I will monitor soil mineralization, nitrification, and denitrification to understand how treatments impact soil nitrogen. I will also monitor weed and tree seedling response to treatments.

Due to negligence, fragmentation, and introduced weeds, our NZ cities have degraded forest fragments. In fact, introduced weedy species are now considered the primary threat to native tree establishment in cities worldwide (Oldfield et al. 2013). Weeds like *Tradescantia fluminensis* stymie native forest community re-generation and ecological function (Standish 2001). This is unfortunate as there are many beneficial ecosystem services that restored functional forest provides, including mitigation of nutrient-rich run-off and decomposition/cycling of organic matter, as well as carbon sequestration and air filtering.

Aside from ecosystem services, there are additional physical, mental, and social benefits of urban forests. Kiri's findings will improve community experience by restoring a native recreational space for Kiwis. This project sits well within the aims of the Dan Watkins Scholarship in Weed Science as it helps our understanding of *T. fluminensis* biology and control.