

Threat from naturalised wildflowers on roadside verges



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The Threat from Naturalised Wildflowers used on Roadside Verges for Native Forests and Agriculture.

The naturalised vascular species of flora throughout New Zealand at present has similar totals to the native species (Williams & Cameron, 2006), and newly naturalised species are being discovered at an increasing rate (Howell, 2008). Approximately 19% of all naturalised species are presently recorded as environmental weeds (Howell, 2008). Unfortunately, these statistics can, incorrectly, give the impression that New Zealand environments are inundated with an abundance of diverse weeds. Rather, the majority of naturalised plants, together with weeds, still inhabit a mere fraction of the wild-land habitats throughout New Zealand (Williams & Wiser, 2004). In the centuries to come, it is predicted that weeds and other naturalised floras will increasingly occupy areas of New Zealand, even for millennia as has appeared to have occurred with Europe's naturalised plants (Pysek & Jarosik, 2005). The general origins of naturalised flora species were as decorative garden and feature plants (Howell, 2008), as such they commonly are present near human settlements (Timmins & Williams, 1991). When random wild-land sites were surveyed few, if any, environmental weed species are generally found (Sullivan, Williams, & Timmins, 2006). This suggests that environmental weeds are generally in the initial stages of infiltration into New Zealand's environments, thus, there is an opportunity to curb further dispersal. Methods of long distance dispersal differ among environmental weed and naturalised flora species, however, the planting and sowing of naturalised flora species, particularly the wildflower varieties, on roadside verges both facilitates the establishment and acts as corridors for the

dispersal agents of these species, for instance stock, people, and vehicles (Overton, Smale, Whaley, Fitzgerald, & McGlone, 2002).

It has been estimated that the naturalised flora species which are present along roadsides are disproportionately early naturalisations that were originally stock-dispersed, and from either or both recent or current agricultural use. The total richness of naturalised flora species on roadside verges can be reflective of habitat and aspects of the neighbouring land use (Ullman, Bannister, & Wilson, 1998). Roadside verges, as well as riparian margins and various other 'waste' areas, contain patches of wild habitats that can act as reservoirs for naturalised flora species in what is otherwise intensively managed rural environments. However, some studies are indecisive when it comes to naturalised flora species utilising roadside verges as linear dispersal corridors autonomously of the neighbouring land. Rather, naturalised flora populations along roadside verges generally imitate the adjacent land and the naturalised flora communities present on that land. However, there will certainly be exceptions to this rule. One example in New Zealand is the Kaffir lily (*Schizostylis coccinea*) present in mid-Canterbury. This lily is spreading beside roads utilising the irrigation ditches (Webb, Sykes, & Garnock-Jones, 1988).

Roadside verges present an unusual, generally uninterrupted continuity of a mono-habitat. Given the variety of wild habitats that roads pass through, it is thought that this is indicative of a present absence of nearby sources that can be used for the purpose of propagating, or a propagule, for these species in the area. The role of propagule pressure at local scales in species distributions is well detailed by Levine (2001) in a related riparian structure <https://assignbuster.com/threat-from-naturalised-wildflowers-on-roadside-verges/>

(Levine, 2001). However, it is vague as to whether various ornamental naturalised flora species that are restricted to roadside verges could maintain their populations without the support of propagules from proximate cultivated sources, especially when it comes to competition from species that are more abundant, such as pastoral grasses, which disperse onto the roadside verges from the neighbouring land.

Regardless of the typical dominance of species from neighbouring environments, roadside verges are not merely expansions of adjacent habitats (Angold, 1997) (Parendes & Jones, 2000). Roadside verges are frequently continuously disturbed and possess altered soil conditions, particularly in close proximity to the traffic lane. They typically have high light availability, specifically verges next to high-traffic roads (Parendes & Jones, 2000). This makes the proximal roadside zone a highly specialised habitat, which in the temperate zones of the Southern Hemisphere is normally occupied by ruderal, or pioneer, flora species generally originating in Eurasia, but they vary with regards to local climatic conditions (Wilson, Rapson, Sykes, Watkins, & Williams, 1992). Over in Australia, tropical grasses often establish on roadside verges and before spreading into neighbouring open woodland (Amor & Stevens, 1976). Generally, woody varieties of naturalised flora are more uncommon on roadside verges than herbaceous species; however, species such as pines and eucalypts (Healey, 1969) can be frequent on roadside verges, provided there is consistent available moisture and low disturbance rates. Such species as *Cotoneaster* spp. tend to be most common on roadside batters, which are generally less

disturbed by roadside maintenance than the flat areas (Sullivan, Williams, Timmins, & Smale, 2009).

Naturalised plant species that are present on roadside verges can endure there as wild populations, yet they still may not infiltrate into the surrounding areas of agriculture and native environments. It is possible that filtering effects may be especially strong in climatically severe locations, even where the neighbouring short flora could give the impression that it is open to invasion. Herbaceous roadside naturalised flora are likely to be ephemerals, and are not able to penetrate neighbouring native vegetation, whereas successful invaders are inclined to be less ephemeral (Winqvist, 2003) and functionally similar to native species (Godfree, Lepschi, & Mallinson, 2004). When it comes to prairie flora with a mix of native and naturalised ruderal species, the naturalised species are more likely to occur on roadsides than the native species (Larson, 2002). It is possible that similar patterns occur within New Zealand; however, ruderal species either native (Wardle, 1991) or naturalised on roadside verges are uncommon. On the other hand, where filtering effects are not as strong, the distribution of naturalised flora along roadside verges may alternatively suggest the initial stages of an invasion into the adjacent flora. In Europe, herbaceous flora could possibly be invaded from 50 to 100m from the roadside verge (Tyser & Worley, 1992) and non-native evergreen woody species in the United States, invaded deciduous forests 120m from the roadside verge plantings (Foreman & Deblinger, 2000). The effects of planting roadside verges with naturalised plants is exemplified in a study conducted by Sullivan, Williams, Timmins, & Smale (2009) regarding the extent of Russell lupins (*Lupinus polyphyllus*)

which has spread from gravelly roadside verges of the Mackenzie Basin into the adjacent degraded tussock grassland, riverbeds will also function similar to roads as key linear corridors for the spreading of plants (Sullivan, Williams, Timmins, & Smale, 2009).

In other circumstances, the discrepancy between naturalised flora on roadside verges and the neighbouring flora may be rather noticeable. Ruderal species are often limited to roadside verges or, for brief distances, into the neighbouring disturbed woodland in environments both different (Wester & Juvik, 1983) and comparable to New Zealand (Pauchard & Alaback, 2004). Whilst generally the Eurasian ruderal species do not establish within New Zealand forests, and it is more likely that the roadside verges will be invaded by shrubs and vines that possess comparable features to the native flora present (Williams, Nicol, & Newfield, 2001). Within New Zealand naturalised flora on roadside verges are influenced by both climatic and altitudinal gradients (Wilson, Rapson, Sykes, Watkins, & Williams, 1992) (Ullman, Bannister, & Wilson, 1995). As the environmental responses are comparable to the responses documented in Europe, it has been recommended that establishment of all obtainable roadside verge sites by the naturalised species has occurred, regardless of the comparatively short time-span since their introduction to New Zealand (Ullman, Bannister, & Wilson, 1995). However, this is unlikely to be true for all naturalised flora within New Zealand as generally there is a strong correlation concerning the time from naturalisation and habitation on roadside verges, as well as for the reason that there are numerous new naturalisations found on roadside verges (Williams & Cameron, 2006). Roadside verges regularly offer the

primary and closest opportunity for naturalised plants to establish past the restrictions of agriculture in what is an intensively managed landscape. 25% of recent naturalisations between 1989 and 2000 were gathered from roadside verges (Williams & Cameron, 2006); though in part this is because of some sampling bias.

The formation of an environment which naturalised flora will find favourable initiates with the construction of the road itself (Greenberg, Crownover, & Gordon, 1997). A frequent effect of road construction is an elevation in the levels of the water-table on roadsides which aids the establishment of naturalised flora particularly in wetlands (Buckley, Crow, Nauertz, & Schulz, 2003), whereas in more arid areas, the runoff delivers water and/or nutrients which then promotes the growth of naturalised flora (Williams & Groves, 1980) more so than with natives (Angold, 1997). More often than not in New Zealand (Ullman, Bannister, & Wilson, 1998), as well as in other parts of the world, naturalised grass species are some of the more commonplace roadside verge species (Tyser & Worley, 1992), as the altered environment and roadside management is beneficial for them, more so than some of the other naturalised plant species, for instance woody species (Angold, 1997). In Westland, New Zealand, within the pakihi vegetation, the construction of roads has assisted the establishment and coverage of naturalised species by altering drainage patterns (as is the case with *Carex ovalis*) as well as increasing nutrient availability due to the soil disturbance (as with *Holcus lanatus*) (Williams, Courtney, Glenny, Hall, & Mew, 1990).

Roads themselves offer a way of accessing the land for a variety of modes of transportation from large vehicles to animals, and all may transport the
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seeds of various flora which are then deposited either haphazardly or specifically in various locations. Thus, it is possible for a species to invade more rapidly along roadside verges than across the landscape overall (Guthrie-Smith, 1953). This is indicated by the naturalised flora diversity and abundance found along the more developed roads (Tyser & Worley, 1992) where the volume of traffic is greater, though the more developed roads may also possess a more altered and more regularly disturbed habitat along the roadside verge, as well as a higher density of human habitations. A mode of dispersal for various seeds and whole seed heads is the capability to be transported via some form of attachment, particularly to vehicles, specifically the smaller seeds which can be transported by the tyres of vehicles and in the soil itself that is adhered to them (Schmidt, 1989). As a result, the seeds present on vehicles can originate from various habitats, and a small number of these species, comparatively, are found on roadside verges, yet the seeds of most naturalised species found on roadside verges are also present on vehicles (Schmidt, 1989).

Vehicles are capable of transporting not just the small seeds of naturalised flora species, which are more commonly than not grass species, but urban garden species as well which are generally wind dispersed (for instance *Buddleja davidii*) or dispersed via animals (such as *Pyracantha spp.*) (Wardle, 1991). The manner in which vehicles act as dispersal agents can be of particular concern to managers of natural areas, for example, in Kakadu National Park, they have found the seeds of roadside weeds in the tyres as well as the mud on vehicles (Lonsdale & Lane, 1994). Unfortunately, a traditional method of washing cars is merely cosmetic, and does nothing to

stop the spread of naturalised species via vehicles. As a result it is improbable that something can be done regarding seeds on private vehicles except in special circumstances, the most effective method to protect sensitive areas is to keep vehicles out altogether (Parendes & Jones, 2000). Alternatively the approach of disregarding the dispersal vectors altogether and focusing on discovering the originating populations of naturalised species in sensitive areas (Lonsdale & Lane, 1994) is possibly the best tactic in New Zealand, however, this may be unreasonable for locating naturalised species that have been spread by four-wheel-drive or 'off road' vehicles on tracks away from established roads.

People who not only use roads but also the methods employed to maintain roads, principally the use ' slashers' on the roadside, are significant vectors for dispersal of naturalised species on roadside verges. Naturalised flora species are particularly dependent on these practices for their vegetative spread, species such as domestic hops (*Humulus lupulus*) within the Buller catchment, Nelson (Sullivan, Williams, Timmins, & Smale, 2009). However, domestic stock is still the primary vector responsible for the dispersal of naturalised agricultural seed species in other parts of the world (Tyser & Worley, 1992) (Pauchard & Alaback, 2004), because they were preceded the introduction of stock transportation vehicles in New Zealand (Guthrie-Smith, 1953). While currently stock droving is not really practised within New Zealand, it is still possible for stock to disperse the seeds of naturalised species when they get transferred around (Tyser & Worley, 1992).

For naturalised species of flora to be actively planted and sowed on roadside verges, for the use in methods such as erosion control and even via the <https://assignbuster.com/threat-from-naturalised-wildflowers-on-roadside-verges/>

dumping of garden waste, has resulted in some significant invasions of flora, for example in the United States, Japanese honeysuckle (*Lonicera japonica*) was used on roadside verges for erosion control and bank stabilisation. However, it quickly became a problem due to its rapid growth rate and capability to displace native plant species (Williams, Timmins, Smith, & Downey, 2001). Japanese honeysuckle is also a problem in New Zealand (DOC, 2014). Russell lupin (*Lupinus polyphyllus*) is another species commonly found on roadside verges throughout New Zealand and presents a threat to native areas. As they are an aggressive species presenting a particular threat to Canterbury's braided riverbeds, with the potential impacts it could have these ecosystems.

Roadside verges are among the areas of habitat suitable for use by environmental weeds and naturalised flora species as they advance their invasions into areas of natural vegetation within New Zealand's landscape. Consequently, the protection of New Zealand's sensitive and valuable conservation reserves from invasion by environmental weeds and naturalised flora species would definitely be advantaged by the control of planting and sowing roadside verges with naturalised wildflowers, particularly when used in combination with other weed control methods in neighbouring habitats that would be suitable for naturalised species.

- Carrie Page