

Canopy manipulations of exotic *Salix elaeagnos* stands promotes indigenous forest regeneration

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New Zealand's indigenous lowland-forest ecosystems are scarce and threatened. Restoring these lowland forests is often complicated by interactions with dominant exotic flora. Exotic-species invasions can profoundly alter both ecosystem structure and function, but in some cases the structure provided by exotic species provides functional benefits (e.g., shelter, shade, bird perches) which might facilitate the recovery of indigenous forest ecosystems. In this sense, exotic species potentially play a role in the restoration of indigenous ecosystems.

I examined whether indigenous forest regeneration within the understorey of exotic *Salix elaeagnos* (Bitter Willow; Salicaceae) stands could be stimulated through the creation of small-scale canopy gaps. In *S. elaeagnos* forest, I poisoned single *S. elaeagnos* trees to create canopy gaps. I then assessed light transmission and patterns in woody seedling regeneration beneath both the modified ($n = 4$) and unmodified ($n = 3$) *S. elaeagnos* canopies, and compared these results with a nearby old-growth forest remnant ($n = 4$).

The creation of canopy gaps significantly increased both transmitted photosynthetically active radiation (PAR) and indigenous woody seedling densities, the latter increasing from $2\,376 \pm 414$ seedlings/ha (2012) to $10\,000 \pm 3\,388$ seedlings/ha (2015). Creation of *S. elaeagnos* canopy gaps significantly affected indigenous canopy species seedling composition and the species responding most strongly to canopy opening were the long-lived mature forest canopy species: *Alectryon excelsus*, *Prumnopitys taxifolia*, *Melicytus ramiflorus*, and *Podocarpus totara*. Podocarp regeneration was significantly greater beneath canopy gaps (c. 40% composition); and podocarp seedlings were absent from the reference site, which was of a podocarp-dominant canopy composition.

These results suggest that single-tree manipulations of exotic *S. elaeagnos* stands provide a potential means of re-establishing indigenous forest canopy species, including the relatively light-demanding podocarp species. These results provide an example of an exotic tree species playing a role in New Zealand lowland-forest restoration.