Australasian Journal of Dermatology

Australasian Journal of Dermatology (2009) **50**, 125–128 doi: 10.1111/j.1440-0960.2009.00521.x

CASE SERIES

Allergic contact dermatitis from exposure to *Grevillea robusta* in New Zealand

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ABSTRACT

There are a number of reports in the literature of allergic contact dermatitis as a result of exposure to the sawdust and plant parts of *Grevillea robusta*. While this tree is prevalent in New Zealand, there seems to have been no previous published accounts of contact dermatitis, although anecdotal evidence indicates that such cases may be common. Two brief case reports are provided regarding severe phytodermatitis to *G. robusta* among professional arborists in New Zealand. As with other common plants capable of inducing allergic contact dermatitis, greater awareness among arborists, orchardists, forestry workers, gardeners, and health professionals will likely result in a reduction of cases.

Key words: *Grevillea* × 'Robyn Gordon', occupational dermatitis, phytodermatitis, sawdust, *Toxicodendron succedaneum*.

INTRODUCTION

Grevillea robusta A. Cunn. × R. Br. is commonly known as (Australian) silky oak or silver oak.[1] It belongs to the family Proteaceae, which has more than 1000 species in 62 genera, found predominantly in the tropics. The genus *Grevillea* is made up of approximately 360 species, the vast majority of which is native to Australia, where they range from low shrubs to forest trees.[2]

In Australia, *G. robusta* is a relatively large evergreen tree (20–30 m tall; Fig. 1),[3] but it seems to be smaller in non-native areas.[4] Its leaves are deeply dissected and subdivided (fern-like), with the complete flower head, or inflorescences, being approximately 12–16 cm long with numerous yellow-orange flowers,[3] in a bottlebrush-like formation (Fig. 2). It is native to eastern Australia, but is now widely planted in many countries, mainly as an ornamental and shade tree, with for example, over 2 million trees having been planted in Hawaii.[3–6] Its pale pinkish-brown wood is attractive due to the prominent rays, which resemble oak; wood from *G. robusta* is also used for flooring, furniture and telegraph poles.[3–5] Its seeds are wind-dispersed and in some areas such as Hawaii, *G. robusta* is naturalized and has become a noxious invasive species.[4,7] It is claimed that the leaves of *G. robusta* produce an allelopathic substance that inhibits the establishment and development of other species.[7]

The first report of contact dermatitis to *Grevillea* is from 1847, when an explorer on an expedition to Queensland, Australia, developed a blistering eruption after carrying *Grevillea* pods near his skin.[8,9] Since then, there have been many reports of allergy to *Grevillea*, as a number of different *Grevillea* species and hybrids appear to cause allergic contact dermatitis.[1,5,8–18] *Grevillea* × 'Robyn Gordon' is perhaps the most important plant in this genus from a human health perspective. It is a natural hybrid between *Grevillea banksii* (Dwarf Silky Oak or Kahili Flower) and *Grevillea bipinnatifida* (Fuschia Grevillea), and is widely planted as an ornamental shrub.[11–15] A relatively recent review from Australia suggested *G.* × 'Robyn Gordon' is the most common cause of plant-induced dermatitis in that country.[11] The allergens appear to differ between species and among their hybrids. The allergens of *G. robusta* are 5-tridecylresorcinol (95%; grevillol, a phenolic compound with a long side chain that resembles the sensitizing urushiols from *Toxicodendron*), 5-pentadecylresorcinol (5%) and 5-pentadecenylyresorcinol (2%).[1]

CASE REPORTS

Both cases reported here occurred in Auckland, New Zealand.

Case 1

A 38-year-old experienced male arborist developed recurrent episodes of itchy skin, followed by oedema and

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Submitted 15 September 2008; accepted 15 December 2008.

Figure 1 *Grevillea robusta* (photo courtesy of Martine De Volder).

formation of vesicles on his forearms, neck and face after working with *G. robusta*. Initially these would settle within 2–3 days, but both the symptoms and their duration became progressively worse each time he worked with the tree, which led to the suspicion of occupational contact dermatitis.

Although he recalled having developed mild dermatitis after pruning *G.* × 'Robyn Gordon', he had previously worked with *G. robusta* in Australia for more than 7 years without experiencing health reactions to it, so initially no link to this tree was established. However, the repeated occurrence of acute contact dermatitis following exposure to *G. robusta* suggested this was the responsible tree. The latest and most severe reaction occurred after spending approximately 30 min working in a *G. robusta*, pruning several branches. Despite wearing protective clothing (long trousers, long-sleeved shirt and hard hat), he came into direct contact with the tree as well as being exposed to small amounts of sawdust, both while cutting the branches with a chainsaw, and chipping them in a commercial wood chipper.

Within 24 h he developed classic signs of phytodermatitis on the exposed areas of skin. He had extensive oedema of

Figure 2 Inflorescences of *Grevillea robusta* (photo courtesy of Dennis Haugen, http://www.forestryimages.org).

the face and eyelids with vesicles and bullae on the neck and limbs. In addition he developed vesicles in the axillae, back of the knees, waistline, and groin, which are characteristic of sawdust dermatitis. On this occasion the dermatitis persisted for more than 2 weeks. Patch tests to *G. robusta* were performed by applying a 1-cm sliver of wood, as well as 1-cm^2 pieces of leaf (upper and lower surfaces), to the forearm, covered with skin tape, for 48 h. At 48 h the readings were negative, but at 96 h, he had a 1+ reaction to the sample of *G. robusta* wood.

A firm diagnosis of allergic contact dermatitis to *G. robusta* was made in light of the positive patch tests, the previous history of dermatitis to *G.* × 'Robyn Gordon', and the observation that avoidance of contact with the plant has prevented the re-occurrence of symptoms.

Case 2

A second arborist (male, 32 years old) reported developing contact dermatitis to *G. robusta*, only after having first developed allergy to *Toxicodendron succedaneum* (Japanese wax tree). He had previously worked with *G. robusta* with no reactions, but appears to have developed a cross reaction to *T. succedaneum.* Since then, any exposure to sawdust from *G. robusta* would lead to contact dermatitis. His last (and most severe reaction) occurred after spending approximately 1 h cutting up a large *G. robusta* tree that had fallen down after a storm. He was consequently well covered in sawdust from this tree.

Initial symptoms were similar to those experienced by the first arborist; namely, sensation of tightening of the skin around the eyes, followed by oedema of the face. Extensive erythema appeared in the flexures, characterized by severe itchiness, and the development of vesicles and bullae within 48 h. Symptoms responded to a combination of oral and topical corticosteroids, but still took 2–3 weeks to settle. Patch testing to small amounts of *G. robusta* sawdust in Vaseline showed a 1+ reaction at both 48 and 96 h.

DISCUSSION

The number of people experiencing allergic contact dermatitis following exposure to *G. robusta* in New Zealand is unknown. However, anecdotal evidence suggests that the incidence of such cases may be high among professional arborists (Gerald Collett, pers. comm., 2008; Steve Thompson, pers. comm., 2008). This has led some arborists to place warning signs on their vehicles (Fig. 3).

These two cases highlight some important features of plant contact dermatitis. While it can develop after a single exposure to an allergen, allergic contact dermatitis may only follow repeated exposures, as in the case of the first arborist, who only developed adverse reactions after many years. Cross-reactions between different plant species can occur, as in the case of the second arborist, who first developed allergic contact dermatitis to *T. succedaneum* and, through a cross-reaction between the allergens urushiol and grevillol, became allergic to *G. robusta*.[19] It is possible that the first arborist was also initially sensitized to *G. robusta* by his exposure to *G.* × 'Robyn Gordon'. There are reports of cross reaction between *G.* × 'Robyn Gordon', *G. banksii* and *G.* × 'Mason's hybrid', but one publication suggests there is no cross-reaction between *G. robusta* and *G. banksii*.[20]

The severity of the dermatitis in both arborists is characteristic of phytodermatitis. Vesicles and bullae are common, and reflect the very acute nature of the allergic contact dermatitis. The facial oedema in particular occurs following exposure to *Toxicodendron* spp., such as *T. succedaneum* and *T. radicans* (poison ivy).[19] Treatment with systemic corticosteroids often needs to be continued for 2–3 weeks, otherwise relapse may occur.

Figure 3 Warning sign against *Grevillea robusta* on truck of an arborist company (photo courtesy of Gerald Collett).

The distribution of the dermatitis is also of interest. Typically the dermatitis following exposure to a plant is confined to the areas that have been in direct contact with the plant only. Sawdust is, however, easily transferred to sites, in particular the trunk, axillae and genitalia (as described here), which have not been directly exposed to plant parts.

CONCLUSION

These brief case reports highlight allergic contact dermatitis following exposure to *G. robusta* in New Zealand, as there appear to be no published accounts for this country. Anecdotal evidence, in contrast, seems to indicate that such cases may occur on a regular basis, being particularly common among professional arborists. Therefore, as with other common plants capable of inducing allergic contact dermatitis, there is a need to raise awareness amongst arborists, orchardists, forestry workers, gardeners, and health professionals.

ACKNOWLEDGEMENTS

We are grateful to Philip Sale and Gerald Collett for providing us with the details of the cases, and their valuable feedback during the preparation of this manuscript. Thanks also to Steve Thompson for input.

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