

Technical note

Seedling production by Madeira vine (*Anredera cordifolia*)

J.T. Swarbrick, Weed Science Consultancy, 15 Katoomba Crescent, Toowoomba, Queensland 4350, Australia.

Abstract

Seedling production by Madeira vine (*Anredera cordifolia* (Ten.) van Steenis) is described for the first time in Australia, from Toowoomba in south-eastern Queensland. Seedlings have been found both below and away from existing clumps of Madeira vine in a local park on several occasions. The production of seedlings by this serious environmental weed has not previously been recorded in Australia, and may help to explain its dispersal to new sites and areas. The possibility of seed production, dispersal and seed banks in the soil as well as of seedlings should be taken into account during the management of this serious environmental weed.

Introduction

Anredera cordifolia (Ten.) van Steenis (Madeira vine, potato vine or lamb's tails) is a serious environmental and urban weed in south-eastern Queensland and north-eastern coastal New South Wales. Australian and New Zealand floras and books on weeds either fail to describe its fruits and seeds (Stanley and Ross 1983) or state that it does not set seed and that all reproduction and dispersal is by aerial axillary and basal rhizomes and tubers (Buchanan 1989, Roy *et al.* 1998). On a global scale Maberley (1987) describes the plant as 'reproducing only by aerial tubers'. If this were the case then all infestations of this weed should be in accessible areas such as present or previous house blocks, beside roads where garden refuse has been dumped or by streams below existing infestations, but this is not always the case.

In 1988 a new path was cut through a previously isolated and largely inaccessible section of dry vine scrub in Redwood Park, Toowoomba. The area is one of dense natural vegetation on a steep and rocky slope about a kilometre from the nearest house and road. As soon as the path was cut it was noticed that it passed through an infestation of Madeira vine. Numerous other infestations have since been noted in this and adjacent parks, although mostly close to roads where they

may have arisen from illegal dumping of garden rubbish.

In about 1994 and again in 1998 seedlings appeared and were collected below existing infestations of Madeira vine in Redwood Park, Toowoomba. Seedlings from the earlier collection were grown on in pots and developed into Madeira vine. Seedlings from the collection of September 1998 (Figure 1) form the basis of this note.

Fruits and seeds of Madeira vine

In his taxonomic revision of the Basellaceae, Sperling (1987) states that the fruits of the Basellaceae are smooth surfaced utricles which are partly or fully enclosed in the dry persistent perianth. He describes Madeira vine fruits as being globose, slightly compressed to triangular, 0.9–1.1 mm, crowned by the enlarged fleshy tri-lobed style base, and loosely enclosed in the floral cup and connivent filaments. The fruits are therefore similar to those of amaranths (*Amaranthus* spp.) in being small, hard, dry, single-seeded and enclosed in the dry perianth wall and being without obvious means of dispersal. They may be dispersed by birds which would feed on the dry seeds and perhaps pass some of them undigested, although the majority probably fall to the ground below the parent plants and are dispersed by the movement of soil and water.

Seedlings of Madeira vine

Madeira vine shows epigeal germination (Figure 2). The small seeds may need light for germination. They appear to germinate only from a few millimetres deep, and have only been found in well lit areas both in silt washed to the side of a path and in soil bound together by a fibrous mass of fine roots

above a path. The tap root swells abruptly into the hypocotyl, which is initially about 1 cm long and 2 mm thick and either pinkish or green. The slightly fleshy green cotyledons are oval to ovate and about 5 mm long, and fall readily. The epicotyl is erect, cylindrical, smooth and green to pink, and produces single alternate leaves. Juvenile leaves are bright green and slightly fleshy, broadly elliptic to ovate and 5–10 mm long, with rounded tips and tapering bases which merge into the 2–5 mm long petioles. The first leaves are readily deciduous, and by the time the seedling is about 3 cm tall the hypocotyl and lower stem are starting to swell. Later leaves become larger and more elongated with pointed tips until they merge into the adult leaf form, whilst becoming more succulent. The stems may lose their pinkish coloration, and by the time the seedlings are about 10 cm tall the hypocotyl and lower stem are distinctly swollen. At this stage outgrowths occur at both cotyledonary axils, and as growth continues swellings also develop in the axils of the shed lower leaves. These swellings develop into leafless lateral tubers around the base of the stem.

Vegetative regrowth

Vegetative regrowth of Madeira vine is quite different from that of seedlings



Figure 1. Dense growth of Madeira vine seedlings in Redwood Park, Toowoomba, in September 1998.



Figure 2. Seedlings of Madeira vine, showing different stages of development.



Figure 3. Vegetative regrowth from rhizome section and advanced seedling of Madeira vine.

(Figure 3). It arises directly from dormant buds on tubers or sections of rhizome in the soil, and may occur from propagules up to 10 cm deep. The vertical subterranean stem is cylindrical and 3–5 mm thick, and carries distinct leaf scars and axillary buds. Although the first leaves are smaller and more rounded than those of the adult stems, they are both more elongated and larger than those of seedlings. Regrowth from vegetative propagules is faster and more vigorous than the growth of seedlings, and can occur in dense shade under existing infestations of Madeira vine.

Discussion

Whilst most reproduction of Madeira vine is undoubtedly by aerial and basal tubers, seedlings also occur although probably only irregularly. Fruit set, seeding and germination may only occur under Australian conditions in particularly favourable years. They may however occur more frequently than is realized, since seed falling under dense established stands of Madeira vine may fail to germinate, whilst seedlings soon develop lateral tubers and

then closely resemble vegetative regrowth. The seedlings in Redwood Park in Toowoomba were only noticed because they were in cleared areas beside paths, and would probably have been overlooked had they occurred elsewhere. Seedlings have been found well away from infestations of parent plants (S. Prior personal communication), suggesting some effective means of seed dispersal. This is likely to have been either through the gut of birds or by soil movement during path and track maintenance.

Seed production by Madeira vine undoubtedly occurs in Australia, and may be commoner than is generally supposed since the fruits and seeds are small and inconspicuous and the plant is seldom collected by botanists since it is very difficult to dry satisfactorily. There is an effective method of seed dispersal, but seedlings may only germinate where there is sufficient light. New infestations of Madeira vine arise through seedlings as well as vegetatively, and this should be taken into account in management plans for this serious environmental weed.

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