Propagation of Flannel Flowers (*Actinotus helianthi*)

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INTRODUCTION

Flannel flowers (*Actinotus helianthi*) are attractive plants endemic to the eastern regions of Australia, particularly on the sandstone areas along the coast of NSW. They are an emerging cut flower crop and there is also considerable interest in this species as a potted plant. For the past 2 years, work carried out at Mount Annan Botanic Garden with the support of the Rural Industries Research and Development Corporation, has concentrated on the development of flannel flowers for horticulture with emphasis on cut flower production.

Flannel flowers were often considered difficult to grow (Offord and Tyler, 1993) and various methods have been assessed for the commercial development of this perennial herbaceous species. Propagation, previously considered one of the major limitations to the development of this species for horticulture, is now a matter of choosing the appropriate technique and plant material.

SEED GERMINATION

Extensive experiments have determined the nature of unreliable germination of flannel flower seeds. *Actinotus* seeds are often dormant at dispersal and they require a period of after-ripening to mature and improve germination. It was found that dry storage for several months increased the germinability and germination could also be promoted by removing the seed coat and testa (Lee, 1996). There is also considerable variation in the germination of seeds collected from different sites. Flannel flower seed may be germinated in dark or light and the optimum temperature is between 12 and 15C (Offord and Tyler, 1993; Lee, 1996). Armed with this information we set out to determine a simple and robust system that can be adopted commercially.

We have found that chemical treatment of seed has been very successful in improving seed germination of flannel flowers. The most promising treatment is the "Instant Smoke Plus" seed primer produced by Kirstenbosch National Botanical Institute in South Africa. These filter papers contain various water soluble substances particularly smoke and other common seed germination stimulators (Brown et al., 1995). These substances are leached out of the filter paper in 50 ml of water and the seeds soaked for 24 h before sowing. Ten different seed collections tested using the seed primer showed improved germination compared with seeds soaked overnight in water. The final germination percentages for these ten seed lots varied between 68% and 96% for the treated seeds and 5% and 59% for the untreated seeds.

The success of smoking alone on seed germination of this species appears to be highly dependant on the application conditions. Smoking of seed for various lengths of time (using a bee-smoker and an enclosed unit) and application of smoked water (Roche et al., 1994) have been evaluated for germination stimulation of *A. helianthi*, however the results are variable and inconclusive. Some seed collections did not respond while others were inhibited by these pretreatments.

Different germination results for various seed collections indicate that genetic and environmental factors play an important role in the viability of flannel flower seeds. It is important now to select lines with consistently high germination rates and blooms suitable for sale as cut flowers.

CUTTING PROPAGATION

Research at Mount Annan Botanic Garden has established that flannel flowers can be successfully propagated vegetatively. Cuttings can be taken throughout the year, although the new growth occurring after flowering is ideal once it is hardened off. This occurs in autumn (March to May). Softwood tip cuttings 10 cm long, with the apex removed to encourage new shoot development, perform best. The lower leaves need to be removed below each new bud carefully avoiding damage to the stem tissue, leaving approximately 3 to 4 leaves near the top. Decreasing the foliage will help reduce fungal problems.

Mist (5 sec every 15 min) is a superior glasshouse treatment to fog as many cuttings rot in the latter environment. During cooler weather, the root zone temperature needs to be maintained above 20C. A well drained mix such as perlite , sand, and coir (4 : 1 : 1, by volume) is required (Offord and Tyler, 1996). Roots appear within several weeks under optimum conditions. Although not essential, cuttings root faster if IBA up to 3000 ppm is applied as a gel or alcohol dip. Roots are easily damaged and care must be taken when potting on.

MICROPROPAGATION

Micropropagation techniques have been developed to commercial standard for one variety of flannel flower and a number of other varieties are currently being assessed. The basic medium used is Murashige and Skoog (MS) medium containing a cytokinin, either BA (benzyladenine) at 5 μM or 2iP (dimethylallyamino purine) at 10 to 12 μM in combination with an auxin like IBA at 0.2 μM. A multiplication rate of at least three times is possible after a 6-week period. Microcuttings can be planted out under a standard misting system and they will strike within 2 to 3 weeks. The use of a softwood rooting powder is beneficial although like conventional cuttings, flannel flowers from tissue culture will produce roots without auxin treatments. The most successful microcuttings are the apical sections, followed by the stem sections. Multiple stemmed microcuttings are unsuitable as they suffer from a higher incidences of fungal growth and consequently breakdown.

A general observation is that the taller growing forms of flannel flower adapt readily to tissue culture conditions. Shorter types have problems initially with microbial contamination due to the proximity to soil or potting mix and because of the short internodes. They are slower to grow once established and work is required to determine optimum growing conditions.

LITERATURE CITED

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Grafting Dwarf *Ixora* Standards

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The *Ixora* genus belongs to the Rubiaceae family along with *Gardenia* and *Rondeletia* which are two other important ornamental genera (Bailey, 1976). However, unlike the other two, *Ixora* does not have a strong perfume.

The inflorescence of this genus consists of 50 to 80 waxy star shaped flowers held in dense terminal and axillary corymbs. All are extremely ornamental with the dwarf cultivars being no exception. Colour range is from red through orange, pink, yellow, and white.

Dwarf cultivars put on spectacular show during summer and autumn. They are used extensively in median strips and roundabouts in the tropics due to their low growth habit, hardiness, and colour. Several taxa are also used for hedges.

The object of grafting dwarf taxa onto hedge type *Ixora* rootstock is to produce a semistandard plant with compact growth and high impact flowers. These are ideal for use in tubs by the pool side and even up your driveway.

ROOTSTOCKS

Most *Ixora* taxa have a relatively short growing season which limits viability of rootstock production from tip cuttings.

Observation of a couple of unkempt hedges of *I. coccinea* L. revealed terminal growth 0.8 to 1.0 m in length. These looked ideal for instant rootstocks.

These long semihardwood growths were taken for preparation during wet weather to prevent excessive desiccation. On return to the propagation shed this material was placed in water containing 100 ppm chlorine.

The cuttings were prepared with a basal cut just below a node. The cutting length was standardised at 80 cm. The apical bud was left intact and any axillary branching removed. Eight to 10 pairs of top leaves were retained.

The cuttings were dipped into IBA (2000 ppm as Rootx-L®) and stuck into a double layer of LC3 Oasis® root cubes for stability and root depth. Baling twine was then used to tie the tops of the cuttings together. It is important not to let the cuttings desiccate during this process

Roots initiate in 6 to 8 weeks. After hardening the plants were potted into 125-mm containers filled with a medium composed of equal parts of composted pine bark fines and quincan (a crushed porous basaltic rock). Nutrients were supplied in the form of Osmocote Plus® 8 to 9 month at recommended rates.

Once established the rooted cuttings are now ready for grafting. All axillary growth is removed, with any leaves present retained on the main stem. The plants are held in a hothouse environment.