GROWTH CONTROL OF AUSTRALIAN ACACIAS

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Frontispiece. *A. glaucoptera* developed for the flowering pot plant market

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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Dedication

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Abstract

The Australian genus *Acacia* includes species with attractively shaped and coloured phyllodes or bipinnate leaves, producing many bright yellow flowers in spherical or cylindrical inflorescences. Some species naturally attain a mature height of less than one metre. This research aimed to produce a small flowering pot plant of *Acacia* less than 35 cm high with more than 50 inflorescences within twenty four months, a potted foliage plant less than 35 cm high within twelve months, or a flowering tub plant less than 1 m high with more than 50 inflorescences within thirty six months.

The species tested were *A. acinacea, A. baileyana, A. baileyana purpurea, A. buxifolia, A. cometes, A. crassuloides, A. craspedocarpa, A. decora, A. drummondii elegans, A. glaucoptera, A. imbricata, A. meisneri, A. myrtifolia, A. notabilis, A. podalyrifolia, A. polybotrya, A. pycnantha, A. retinodes, A. semilunata, A. vestita*, and *A. verniciflua*. All experimental plants were grown from seed.

Reduction of plant height has been achieved in other genera using techniques such as high night temperature and chemical application of growth retardants. Flower development in *A. pycnantha* is known to be responsive to low temperature. Thus experimentation included both controlled environment and chemical treatments.

Low temperature (15°C day/10°C night) reduced shoot length and node number in mature plants of *A. notabilis*. Paclobutrazol (2 mgai) reduced vegetative growth at both 15/10 and 20/8.

High night temperature (20/25) had no effect on height or flowering of *A. glaucoptera* or *A. imbricata*, or on height of *A. craspedocarpa*.

After several weeks at low temperature (15/10), strong flowering occurred in plants of *A. acinacea, A. buxifolia, A. drummondii elegans, A. glaucoptera* , and *A. myrtifolia*, but at high temperature (25/20) weak flowering occurred after a

few days and was not sustained. Examination by environmental scanning electron microscopy of *A. drummondii elegans* inflorescences showed inhibition of stamen development and anthesis at high temperature.

Seedlings of *A. acinacea* and *A. imbricata* treated with paclobutrazol (2 mgai) or *A. glaucoptera* treated with 4 mgai, either alone or in combination with pruning or 6, benzyl-amino purine, produced flowering plants of less than 35 cm height within twenty four months. However paclobutrazol reduced the number of inflorescences in *A. acinacea.* Pruning did not control plant height. The cytokinin 6, benzyl-amino purine did not increase branching and flowering at the rates tested.

A. vestita treated with 2 mgai paclobutrazol, and *A. baileyana* and *A. podalyrifolia* treated with 4 mgai paclobutrazol produced foliage pot plants less than 35 cm high either alone (*A. podalyrifolia, A. vestita*), or in combination with pruning, within twelve months. *A. cometes* and *A. crassuloides* produced small sized foliage plants without treatment within twelve months.

A. buxifolia, A. decora and *A. drummondii elegans* produced tub plants less than one metre tall with more than 50 inflorescences within twenty eight months with no chemical treatment.

The period of juvenility before flowering for *A. drummondii elegans* was nine months, *A. glaucoptera* sixteen months, *A. meisneri* seventeen months and *A. cometes* twenty three months. The holding period to flowering could be minimised for *A. drummondii elegans* and *A. glaucoptera* by selection of sowing time.

This study has produced a protocol for production of flowering pot plants of *A. acinacea* using a combination of pruning and paclobutrazol. A protocol for tub plants of *A. buxifolia* , *A. drummondii elegans* and *A. myrtifolia* produced satisfactory results for a flowering tub plant with pruning only, thus avoiding the need for chemical treatment.

Variability in plant size and maturity presented problems in the research. This should be addressed by investigation of clonal propagation of early flowering selections. Future work is required to finalise a protocol which combines low temperature flowering control with time of sowing and chemical size control to produce a potted flowering *Acacia* plant in the minimum time possible.

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