



Department of  
Agriculture



No. 62, June 2004

ISSN 1444-1810



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**2004 WAXFLOWER  
CONFERENCE - HIGHLIGHTS**

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**LATEST FROM THE PROTEA  
WORLD**

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**SEASONAL REMINDERS**

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**UPCOMING WORKSHOPS**



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**Website address for newsletter:** <http://www.agric.wa.gov.au/programs/hort/floriculture/>

**Front cover:**

The participants at the Waxflower 2004 conference spent a day undertaking detailed learning in a series of workshops, then finished the day with lunch in the Swan Valley and a field visit to Muchea Gold at Muchea.

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# The latest from the Protea world

Gerry Parlevliet, Senior Development Officer

The International Protea Conference held in Melbourne during April 2004 provided delegates with a good opportunity to get a global view of their industry including the latest developments in Protea research. Only one Western Australian grower was present although there were several WA researchers contributing papers.

This biennial conference is the stage for researchers and growers from around the world to provide reports on industry change and the latest research. The participants also had a chance to examine the operations of two large flower operations near Melbourne – Proteaflora and Teeslaar Bulbs.

The conference repeatedly expressed concern about reduced research by governments and about the unwillingness for industry to contribute to research. The usefulness of a national peak body was presented by a number of participants.

The main conference program was divided into a series of sessions focusing on different aspects of the industry.

## Breeding and propagation

University of WA researcher Guijun Yan explained the benefits of developing sex determining DNA markers to help identify Leucadendrons male and female plants at very early stages, i.e. in tissue culture or as embryos. French researchers looked at the techniques for improving multiplication rates in tissue culture. Ben Crawford, UWA, described trials helping to improve multiplication of Leucadendrons in tissue culture and improving the root strike in transition to nursery. A Spanish research had tried different wounding treatments to encourage root strike with limited success, however, they did find more acid media around pH 4 gave better results. The rooting hormone IPA was essential in improving rooting.

## Market satisfaction

Robyn McConchie from the University of Sydney reviewed a series of research results aimed at improving Protea post-harvest quality and particularly that of leaf blackening. She is sure that this is due to loss of carbohydrates and the research showed positive



benefits from using glucose solutions as a pulse (about 3% for some but needs to be tested for each type and variety) while Leucadendrons can be held in a 1–2% solution. She went on to describe a range of new developments for transporting flowers by hand with minimal moisture loss using a system called 'Procono' – a bucket with solution, cardboard top with ventilation at the top and using fast top down pre cooling. Ross Worrall from NSW Agriculture stated that 70% of potential vase life for Waratah is developed under the growing conditions but no clear benefit from extra sucrose was suggested. STS helped if flowers were exposed to ethylene.

## Production innovation

South African researchers have conducted work on Leucadendrons and have concluded that it is a short day plant; it flowers under short days. It is not yet clear what length of day triggers flowering but the work suggests that it is practical to delay flowering by using light at night. Delays of two or more months could be achieved. It also has implication for Leucadendrons as pot plants.

Researchers from the University of Sydney working on Waratah have carried out shading trials with 50% shade cloth that significantly reduce bract browning. Work by Ross Worrall and others showed that Waratah responds to phosphate nutrition but high levels of nitrogen appears to increase risk of disease, especially Rhizoctonia and Pythium.

Some other research in Israel has shown very significant responses of Protea 'Pink Ice' to gibberellic acid where it improved the size of flowers and their colour. The controls were relatively small and poorly coloured so this research may need to be experimented with on-farm before growers try it on a large scale.

## Farm management systems

Several growers and researchers including Gerry Parlevliet presented cases for better recording of information on production, costs and income. Details of local benchmarking results will be discussed in detail in future editions of *Floriculture News*. Some of the basics are also discussed in the articles on waxflower.

## Word from the editors

This edition of the *Floriculture News* features the Waxflower Conference held in Perth in March 2004. Waxflower is the major export flower crop for Western Australian growers. The conference was conducted to ensure growers had access to the best possible information for production and management. According to the strong feedback received (and still being received) the conference hit the right balance and participants were happy with the outcomes.

The need for growers to come together in a friendly environment to learn and share knowledge became very clear during and after the conference. There was animated discussion during all breaks and social events.

This type of industry function would be of benefit to all growers of flowers in all commodity groups. Sharing knowledge, sharing experience and sharing hospitality all help to create a strong and efficient industry. All growers can benefit from these gatherings no matter how big or small because there is always some element of production, processing or marketing that they have yet to master.

The Department of Agriculture is happy to work with growers and groups of growers to develop other opportunities such as the Waxflower Conference. This requires growers to identify what they need and then identify other growers with similar issues and be prepared to help us to develop the activity. Let us know if you have any ideas.

*Gerry Parlevliet and Chris Newell*

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### Waxflower Nutrition and Benchmarking workshops/visits in South Australia and Victoria/NSW - 6, 8 and 9 July

Kevin Seaton and Gerry Parlevliet will be conducting a workshop with waxflower growers in South Australia at Tailem Bend on Tuesday 6 July. A field visit will also be conducted in the afternoon. Growers interested can contact Kevin Seaton on (08) 9368 3244 or Gerry Parlevliet on (08) 9368 3219.

On Thursday 8 and Friday 9 discussions on these topics will be held with growers around the Grampians and Dareton respectively. These are less advanced in organisation but anyone interested can again contact Kevin Seaton on (08) 9368 3244 or Gerry Parlevliet (08) 9368 3219. These are RIRDC projects.

### Workshops on Nutrition and Benchmarking in Queensland - 21 September 2004

A Nutrition and Benchmarking workshop for waxflower growers is being conducted at Gatton by Kevin Seaton and Gerry Parlevliet. Details will be circulated to growers in Queensland by their industry group closer to the time. These are RIRDC projects. Other interested growers can contact Gerry Parlevliet on (08) 9368 3219 or Kevin Seaton on (08) 9368 3244.

# Seasonal reminders

Max Crowhurst, Senior Technical Officer

The notes prepared for this newsletter are relative to late autumn and winter management issues.

This summer has stretched water resources to the maximum for those growers reliant on surface water. The South Coastal areas have generally experienced milder conditions as expected, and have received some summer rainfall. The West Coastal areas have been hot and dry with full reliance on irrigation. As we manage the 'break of the season', it is important to review some of the management issues leading into winter.

## Management diary

### Irrigation

As the irrigation demands taper off, consider an EC test (salinity) of the water source for comparative analysis with the test that should always be taken at the beginning of the irrigation season. This will establish any trends that may be indicative of declining quality of supply and hopefully allow for remedial action for next season.

**Important note:** When managing first season flower plantations where plastic film mulch has been used, be aware that some irrigation may be required during the winter rainfall months.

Depending on the width covered by the mulch, the soil may be shielded from some of the rainfall (depending on condition and quality of film). Plant growth can be restricted as a result. In newly established plantations, the root systems will not have penetrated to the edge of the mulch to pick up all of the available moisture.

### Weed control

Controlling weeds when they are small is important. Not only are they more easily controlled, but it also allows for economical rates of chemicals to be used. It is advisable to split the spray program rather than wait for a complete germination over a longer period. The earlier germinating weeds will be difficult to control when the winter break occurs. Remember, when using pre-emergence herbicides, they must be applied before the weeds germinate.

Some sites have carryover weeds from the summer months. These can be controlled with broad-spectrum 'knock-down' herbicides, most of which are compatible with pre-emergents.

Care should always be exercised when using a pre-emergent and some types of knockdown herbicides around Proteaceae stands.

**Annual grasses** are relatively easy to control in flower stands. It is important to target the weeds at between the two to three leaf stages of development. It is

possible to use an in-crop, systemic herbicide, to spray over most flower crops. Check with your chemical reseller for application listings.

**Where mulch has been incorporated along the rows, non-selective herbicides can be used on the inter-row sections.**

**Broad-leaf weeds** are more difficult to control. Good results can be achieved using a hooded wand and non-selective herbicides. **A precautionary note:** The feeding roots of Proteaceae stands can be affected by herbicides; employ translocating modes of action to control weeds.

Last, but not least is hand weeding to remove stubborn weeds from around the base of plants. Remember that some flower species do not like root disturbance, therefore weeds need to be carefully removed with minimal soil disturbance.

**When establishing a flower stand** for the first time, take notice of the particular weed burden and aim to eradicate at least the broad-leaf weeds before establishment. Sorrel is almost impossible to eradicate from a flower stand because of its perennial nature. It reproduces from seed (up to five years after one seed set) and root suckers. Some pre-planting control, at least the year before is essential. Sorrel is known as the 'sour soil' weed and indicates an acid soil and low nutrition status. Changing soil pH by liming can help to control this weed.

### Insect control

'Hot-spot' spraying can be a useful management tool where isolated insect infestations are noted. Careful examination of the flower stand is important to determine whether **spot spraying** is applicable or **blanket spraying** is necessary.

Targeting just the affected areas where the insect population is proliferating can be a useful Integrated Pest Management tool. It allows for natural build-up of predator species and is ecologically sound. Remember to buffer spray around the infested area.

While most insect pests proliferate during the spring months, plant species flowering at other times of the year will also be subject to some form of insect predation.

**A reminder to Banksia growers: The Banksia Boring Moth** (BBM) will be active throughout the year. Care should be exercised when inspecting stands of *B. hookeriana*, *B. menziesii*, and *B. prionotes* which flower during the autumn and early winter season. Dark areas appearing on sections of the flowering head, protruding florets, or distorted cones are symptoms of the BBM larvae chewing the centre of the flower.

Chemical control is only possible before the larvae bore into the flower stem. Spraying with Dominex® on a regular basis, during early bloom formation, will help to control adult moth populations and exposed larvae. Adopting best practice hygiene management by removing infested flower heads, and incinerating them off-site, will further aid the control measures.

**Banksia leaf gall** is becoming prevalent in some stands. Little is known of the insect pests that cause these leaf disfiguring growths. The gall midge or gall wasp is thought to be implicated. The only effective control method at the present time, is to remove the branches containing the affected leaves and dispose by burning. Early detection is important to break the life cycle.

**African black beetle** begin flight activity in late summer–autumn. Flower crops, which may have been free of this pest, can suddenly become infested. Adults are usually abundant in the winter months and eggs are laid in spring. Larvae develop in summer. **Boronia growers** especially need to be vigilant as the adult beetle directly attacks Boronia roots. Plastic mulch provides ideal shelter for these pests. Control can be established by injecting insecticide into the fertigation system. Check with your chemical re-seller for the latest registered control.

#### Disease control

**Fungal diseases** continue to be prevalent with **Botrytis**, **Alternaria** and **powdery mildew** outbreaks noted in *Verticordia* and waxes. The diseases also attack other species, including Proteas and Banksias. Check within the bush canopy as well as the outside leaves for signs of grey fine threadlike material, common to *Botrytis* fungal build-up.

Growers maintaining propagation facilities are advised to watch for *Botrytis* and Powdery Mildew infections in the late autumn months.

**Powdery mildew** will still be prevalent until cold weather and wet conditions limit spore activity.

**Alternaria leaf spot** cause major problems to Protea growers if left undetected. A regimen of preventive spraying is the best safeguard against all fungal diseases.

The fungus ***Colletotrichum acutatum*** is a non host specific background pathogen. It has been detected on waxflower previously and has now been isolated on Boronia.

It seldom causes plant death, however, individual stem deaths on single bushes can occur, as a result of this fungal attack. Those often unexplained stem deaths observed in many flower stands can sometimes be attributed to this pathogen.

Preventative spraying with Mancozeb® (not registered for this infection), which is used in rotation with other chemicals for specific fungal control, will also help prevent the build-up of this little documented disease.

**In general**, it is important to remember to rotate chemicals, using fungicides from different chemical groups. An important rule is to only use a given fungicide for two consecutive sprays, then change to a fungicide with a different active ingredient. Introduce a Mancozeb® spray on a monthly rotation with the other fungicides. This will help prevent fungal resistance.

It is important to start spraying before any visual signs of disease appear. In the case of **waxflowers**, monthly sprays should be applied till bud break. Spraying should then **increase to a 10 to 14 day cycle**, depending on prevailing weather conditions.

#### Nutrition

From April, nitrogen uptake of **waxflowers** should be **reduced** to 7 kg N/1000 plants if applying by fertigation. Reduce rates of all nutrients at budding to minimise ongrowth.

As a general rule for all flower crops, fertiliser applications should finish about six weeks before flowering to reduce the prevalence of 'tipping' ongrowth.

Consider alternating the nitrogen applications from time to time to prevent acidifying the soil. If this is a concern, consider providing the nitrogen source as calcium nitrate.

**Note:** *Mention of trade names does not imply endorsement or preference of any company's product by the Department of Agriculture. Any omission of a trade name is unintentional.*

## Flowerswest Annual General Meeting - Saturday 26 June 2004

Starting at 9.30 a.m. in Seminar Room 3 at Technology Park, Brodie-Hall Drive, Bentley. Growers should have received a notice some weeks ago. Further information can be obtained from any Flowerswest committee member or from Bill Hoffman on (08) 9571 4189.

# 2004 Waxflower Conference:

## A success for growers

Nikki Poulish, Development Officer, Mt Barker

'Growing and Marketing Superior Waxflower' proved a popular theme for this year's Waxflower Conference, providing growers with insight into ways to improve crop management and agronomy, maximising profitability and looking at marketing ideas.

The conference was well attended with 80 growers, consultants, researchers and other industry players attending the two days. Although the conference was focused on WA, a number of growers and researchers from other States attended both days.

Digby Grows, manager of the Floriculture project in the Department of Agriculture opened the conference, which this year featured speakers and discussion opportunities on climatic trends, irrigation, nutrition, and marketing and was well received by all participants.

Following the speakers was the launch of new Pearlflower variety 'Laura Mae Pearl' by the WA Minister for Agriculture the Honourable Mr Kim Chance. In addition to Laura Mae Pearl, five new private releases of waxflower from Brian Jack of Western Flora were announced – 'Lilac Spring', 'Purple Giant', 'Blossom Fireball', 'Stefans Delight' and 'Teinas Delight'.

Industry trade displays on irrigation, nurseries, flower traders and exporters were exhibited throughout the conference and provided an opportunity for growers to catch up with new products and technologies.

Over the conference dinner, Jamie Creer from The Australian Flower Company spoke on his study tour of the emerging Peruvian cut flower industry and the potential threat this holds for other flower producing nations.

The second day of the conference was more practically focused with a series of concurrent workshops and a field tour.

The morning workshops covered four main topics including:

- Calculating fertiliser needs and identifying nutrient deficiencies (Kevin Seaton)
- Monitoring irrigation with tensiometers and calibrating irrigation systems (Tim Calder)
- Calibrating equipment and measuring soil and water pH and EC (Aileen Reid)
- Pre-plant management of cuttings (Brian Jack)

The afternoon field tour started with lunch at Houghton's Winery in the Swan Valley. Then Bill and Lyn Hoffman of Mucnea Gold Waxflower Farm hosted our conference tour over their property looking at irrigation and nutrition trials, irrigation systems, seedling nursery area and packing and processing sheds.



The waxflower conference, workshops and field tour not only provided growers with an opportunity to hear about the latest research, but also to meet and provide feedback to researchers and other growers in their industry.

# Waxflowers from nursery through to field

Gerry Parlevliet, Senior Development Officer, Department of Agriculture

## Introduction

Producing waxflower profitably is no easy thing, and growers must take into account a range of issues and solutions facing waxflower growers. *These topics are further discussed by conference presenters in other reviews.*

## Climate

Climate is not something that growers can do a lot about once a crop is in the ground. Selecting the right site with due regard for the climate for production is essential for new establishments. Low rainfall can be countered by irrigation, frost can be modified by smoke, fans or sprays and windbreaks can be used to avoid the impact of strong hot winds. Climate, however, has a very significant impact – the general global warming and predicted climate change is likely to change how waxflower grows and produces in the future.

## Planting material

Plant establishment and survival in the field is critical to the development of healthy plants and to ensure early production. There have been many cases of root binding causing death of plants. A research project is under way looking at different development environments for cuttings and some planting requirements.

## Irrigation

Generally wax growers are under watering waxflower. Often they do not install an efficient system and most do not monitor the effectiveness of the irrigation.

## Nutrition

Without nutrients plants just don't thrive. Growers have applied different levels of fertiliser in different ways and developed their preferred levels and timing. It is clear that waxflower responds to the major elements, so to reach optimum yields and quality the right level of nutrients need to be applied. Dr Kevin Seaton is working with growers in a new project funded by the Department of Agriculture and RIRDC and with contributions from growers. The three-year project will establish a better understanding of the way waxflower responds to nutrients in pots and in the field.

## Practical waxflower growing

The grower has to collect vast amounts of information, make a huge number of decisions when growing the waxflower. In the process they adapt production systems to suit their own needs. Julie Rowe and

husband David who farm at Northampton, shared their experiences.

## Economics

Producing waxflower is all about making a profit. The simplest way to measure that is the bank balance at the end of the year. However, this does not help identify the key profit varieties or the varieties that are losing money. Some preliminary results from a small project looking at benchmarking the profitability of the industry were presented.

## Export markets

For many the export market is of no concern. The last some growers see of their product is when it goes into the carton and is shipped to the exporter. However, the demand for the product, the cost of transport and the exchange rates dramatically impact on final outcomes. Quality product, new varieties and constant market development are essential to maintaining an outlet for our product at an appropriate price.

## Marketing flowers on the domestic market

The domestic market is underdeveloped for flowers, and the proportion of shoppers taking flowers home from florist, supermarket, deli or service station is not as high as that in some of the mature markets such as Europe. The specialists suggest that with suitable promotional/marketing activity a permanent increase in sales can occur, but this requires a great level of preparation and skill. Previous attempts have been one-off with little continuity. Equally it is practical for wax growers, exporters and wholesalers to work with flower outlets to increase the demand for waxflower as a buffer for international disruptions.

## Florists

There are over 250 florists in WA, with the majority in the metropolitan area. They are an important outlet for flowers. They rarely use native flowers and many do not know how to use them well. A group of creative florists do extend their range of product used and include suitable native flowers and wax. A common comment is that florists cannot get the range of new high quality wax varieties that are exported. There needs to be more activity to show the range of quality product available. Low local demand has resulted in growers, exporters and wholesalers not delivering volume. It is in the best interest of growers to encourage more florists to use wax and to expand the market domestically and overseas.

## Supermarkets, delis and service stations

These are rapidly becoming the main point of sale for many flowers. These are low priced and assembled under contract by agents to a price point. Wax is used but not as much as is desirable nor is the quality wax used and this should be a target for industry development.

## On the table - the consumer

Growing flowers is only done to get them onto tables and counters in homes, offices and the like. This means providing what the market wants (when they know what

they want) or telling them about the product and actively selling the product.

The consumer is unlikely to ask for a bunch of Bridal Pearl but a well developed bunch with additional foliage and colour is a very marketable product. They are likely to buy and repeat buy because of the excellent vase life. The terminal nature of the new wax varieties lend themselves to a greater use in bouquets and arrangements.

# Changing climate: Impact on waxflower production

Ian Foster, Climatologist, Department of Agriculture

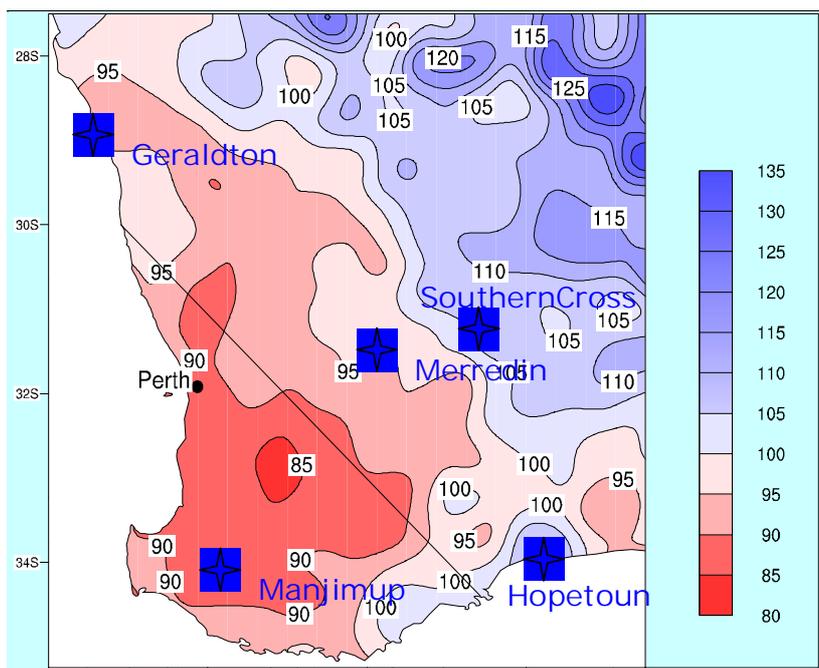
Review: Nikki Poulish, Development Officer, Mt Barker

Looking at climatic trends across Australia. Observed climatic trends during the 20<sup>th</sup> Century: the May–October rainfall has decreased by up to 15% over the south-west region of WA (Geraldton to Albany) and southern Victoria, especially since the 1970s. Summer rainfall has increased over far eastern agricultural districts of WA, the South Coast, and much of inland Australia. There has been a decrease of summer rainfall over south-eastern Queensland. There has also been a trend of increasing minimum and maximum temperatures over much of Australia (up 1–3°C in some parts).

## Current climate change projections for south-western Australia

- Warmer by 0.4 to 2°C by 2030, 1 to 6°C by 2070.
- More hot days and fewer cold days.
- Rainfall decreases possible, particularly in winter and spring.
- Increased evaporation and changing water balance.

## Climate Risks and Opportunities Project (CROP) data



## Implications for horticulture

- Plant development/vernalisation, need to assess varieties.
- Length of irrigation time (might increase with less rainfall and higher temperatures).
- On-farm water supplies (re-assess dam catchment design).
- Access to off-farm water supplies (competition with urban areas for water).
- Plant diseases.
- Insects (changing patterns of occurrence or active species).
- Frost (incidence might decrease over time).

# Water needs of waxflowers

Presenter: John Considine, University of Western Australia

Review: Nikki Poulish, Development Officer, Mt Barker

## Key points

- Waxflower stem length and branching is affected by water availability.
- You can significantly reduce water use by waxflower under 50% shade without affecting product quality.
- Water stress just prior to harvest significantly increases the vase life of waxflowers.
- Post-harvest wilting can also occur with minimal impact on subsequent vase life.

Irrigating waxflowers has been under debate for years with growers on both sides of the fence, but research is pointing to real benefits for irrigated waxflower production. This talk summarises the work carried out by two research students, Dr Kandia Akilan and Mrs Linda Manning.

Contrary to popular belief, waxflowers are drought avoiding rather than drought tolerant plants. That is, they occur naturally where there is an adequate supply of soil moisture.

With a high rate of transpiration, waxflowers are actually quite sensitive to water availability and where there is not a sufficient water supply, the first response is a reduction of stem length and branching and under severe stress, leaf drop will occur.

However, waxes are also sensitive to overwatering. Root disease is the number one issue with wax plant survival and if waterlogging occurs in the root zone,

the decreased levels of oxygen increases the risk of disease significantly. Overhead watering in particular is linked to increased occurrence of disease.

Research has shown that a plentiful water supply will allow waxflowers to:

- increase their stem length;
- increase stem branching;
- decrease leaf drop.

Under shade, waxflowers are seen to decrease their rate of water use significantly and under 50% shade, water use can be reduced without affecting stem length or branching. This is because these plants use evaporation to keep cool, as transpirational water loss, is driven primarily by radiation levels.

## Post-harvest effects

Mild water stress just before harvest can significantly increase the vase life of waxflowers and in experimental circumstances has led to a several-fold increase.

The benefits of mild water deficit stress have not been assessed in commercial circumstances. However, there are examples in other crops that suggest these benefits may be practical (e.g. grapes) and some further research to assess these impacts may yield significant benefits for growers and consumers.

The prospect of being able to wilt stems before packing may also lead to a reduction in *Botrytis* problems when shipping, and a greater packing density. However, these prospects definitely should be treated cautiously and reviewed in practical situations before any attempt is made to apply them at a commercial scale.



## Waterwise on the farm

Presenter: James Dee, Department of Agriculture

*WaterWise on the Farm* is an irrigation management training course that can assist you to become a more profitable, efficient, sustainable and environmentally responsible irrigator.

The training consists of four workshops:

- Assessing your soil and water resources
- Evaluating your irrigation system
- Scheduling and benchmarking
- Irrigation and drainage management planning

There is also some one-on-one support available between each workshop.

The training aims to:

### 1. Maximise potential profit from your irrigation resources

By using your irrigation resources efficiently and effectively, you can maximise the amount and quality of product you have to sell. This will also reduce your cost of production.

## 2. Get surplus irrigation water

Improving irrigation efficiency may provide surplus irrigation water which can be used for further plantings (increasing your scale of production) or to provide an income through sale or lease of surplus water.

## 3. Reduce pests and diseases

Maintaining optimum soil water levels will aid crop performance and mean fewer problems with maintaining crop health.

## 4. Reduce impacts on the environment

Reducing excess irrigation minimises waterlogging, salinity, leaching of nutrients and chemicals

National Accreditation is available for the skills developed during the workshops and when training is complete, 50% of the cost for irrigation management upgrades up to a maximum of \$2000 per business can be obtained.

# Managing nutrition and irrigation

Presenter: Lawrence Kirton, Rootzone Solutions

Review: Nikki Poulish, Development Officer, Mt Barker

'To measure is to know' monitoring is the key to understanding exactly what is happening in your production system.

There are a number of key elements in waxflower production that have a huge impact on yield and quality of the end product.

### Planting

Maximising exposure to sunlight increases growth rates, so orientation of rows and plant spacings must be well planned (e.g. north–south).

### Water

Good quality water should be used and targeted at the active root zone. In waxflower, 80% of the active feeder roots are in the surface 10–15 cm. It is estimated that 80% of yield increases relate to water management.

Just remember waxflower have a water use ET (evapotranspiration) crop factor of 0.6 to 0.7, so for every 10 mm water evaporated, 6 to 7 mm is used by the plant.

### Nutrition

The macro nutrients nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg), and the trace elements must be present in the active root zone in a nutrient solution (mixed with water) to be readily taken up by the plant.

The balance of all nutrients available to the waxflower is important for quality production, as high or low levels of particular nutrients can inhibit the uptake of others. For example if K is excessive, Mg uptake will be severely inhibited.

The ratio of N:K is crucial in a number of crops and waxflowers are no exception. Nitrogen levels must be high in the vegetative stage, while K must be high in the flowering phase. Key stages for nutrient applications are:

#### 1. Vegetative stage

Nitrogen is important for early vegetative growth, particularly beneficial is the ammonium ( $\text{NH}_4^+$ ) ion as this is readily available to the plant.

#### 2. Root growth

Phosphate and calcium are essential for root growth.

#### 3. Flowering

At flowering don't forget the importance of Boron (B) as it is involved in pollen tube formation. Potassium is very important for bloom quality and Ca is important for stem strength. Nitrogen should be restricted prior to flowering to produce maximum flower quality.

#### 4. After harvest

Building up reserves in plant prior to the dormancy period will ensure the plant is ready to re-shoot. Apply balanced amounts of all nutrients, N, P, K, Ca in small quantities to build up carbohydrate levels.

# Monitoring waxflower irrigation: Use of continuous moisture monitoring sensors

Presenter: Ken Young, Grower, Queensland

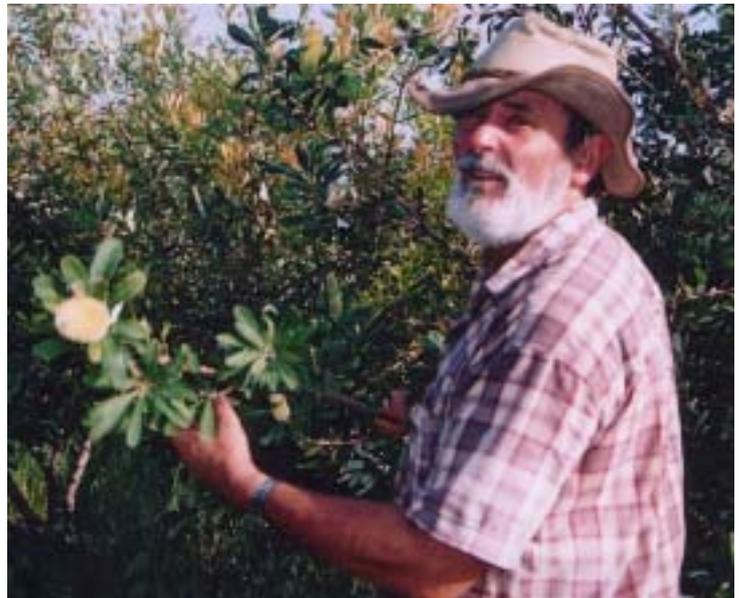
Review: Nikki Poulish, Development Officer, Mt Barker

Ken Young and a group of growers in the Lockyer Valley in Queensland have all participated in an irrigation trial for their waxflowers.

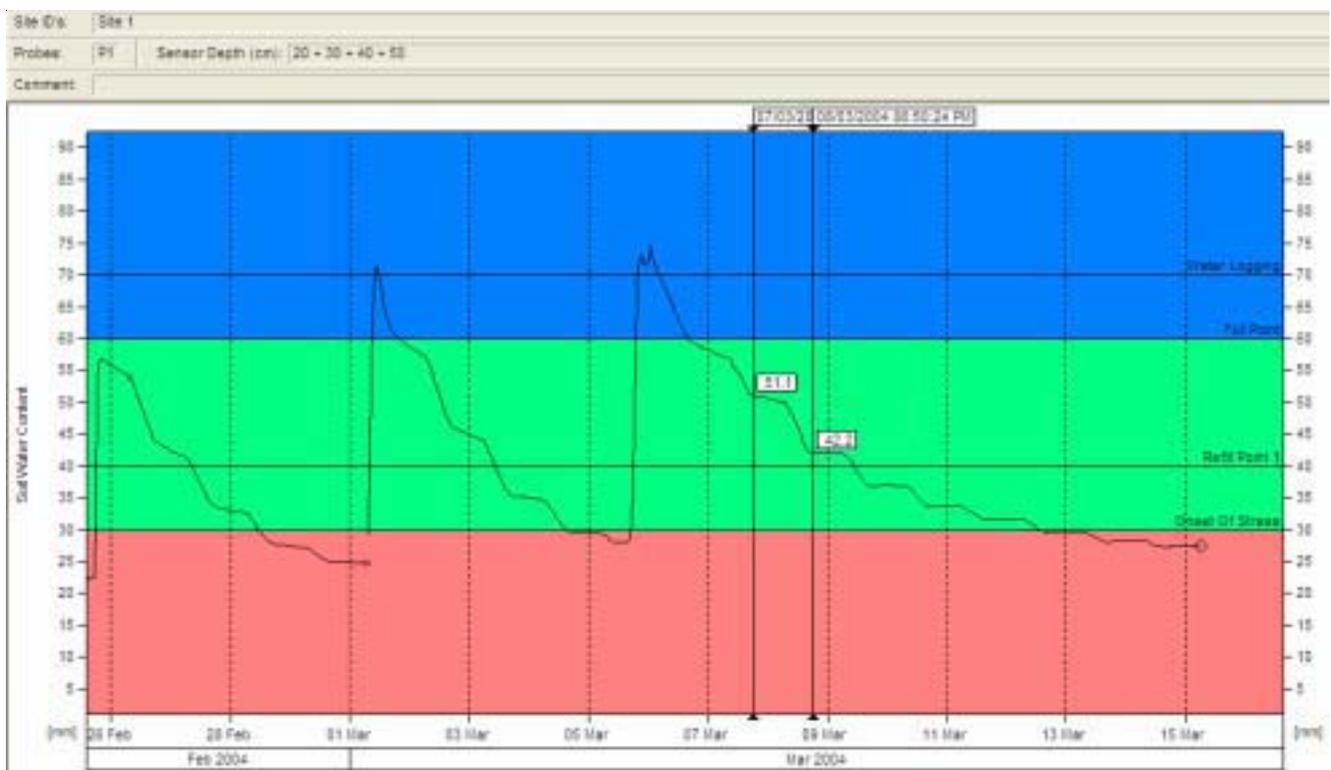
Using continuous moisture monitoring sensors, they have determined the optimal irrigation amount and frequency for premium quality waxflower production.

Firstly they calculate the water-holding capacity of the soil. This is followed by a calculation of the daily water use which reveals the irrigation interval required on different soils for each crop.

This strategic irrigation keeps water in the root zone of the plant thereby reducing any water wastage.



Queensland waxflower grower Ken Young.



Example of an output chart showing the optimal irrigation interval (from plant stress to soil water holding capacity) for specific soil types.

# Good nutrition of waxflowers

Presenter: Kevin Seaton, Department of Agriculture

Review: Nikki Poulish, Development Officer, Mt Barker

Correct fertiliser management is essential to the production of long stems and a full display of flowers in waxflowers. Without this the stems can be short or thick showing on-growth and a sparse flower display. Achieving good fertiliser management of waxflower requires supplying moderate rates of a balance of nutrients to plants.

Nutrient deficiency symptoms give an indication that the plant is not receiving sufficient nutrients. Interpreting deficiency symptoms needs to be considered in terms of nutrient mobility as nutrients have different levels of mobility within the plant.

- Highly mobile: nitrogen (N), phosphorus (P), potassium (K), magnesium (Mg).
- Moderately mobile: sulphur (S), copper (Cu), zinc (Zn), molybdenum (Mo).
- Low mobility: calcium (Ca) and manganese (Mn), copper (Cu).

The soil environment can also limit the supply of nutrients to plant roots. Soils which are highly acid can lock up nutrients such as phosphorus, potassium, calcium and magnesium while alkaline soils can lock up copper, iron, manganese and zinc. In these situations, even though there are nutrients present in the soil the plant can't access them. Irrigation supply can also greatly affect the availability of nutrients.

While tissue testing can give a good indication of nutrient levels, it is important to take seasonal variation into account if planning a radical change in fertiliser application rates. Fertiliser mixes and amounts should also be varied according to plant seasonal requirements. Expected standard nutrient levels for good nutrition are being developed for waxflower, particularly the new hybrids.

## Nutrient deficiencies

A new (RIRDC) project has started looking at symptoms of nutrient deficiencies in waxflowers. The project is examining both short-term leaf symptoms and long-term whole plant symptoms.

An initial glasshouse trial has been conducted giving excellent results in short-term 'leaf symptoms' of nutrient deficiencies, but further trials will be conducted before results will be released.

Often fertilisers are not available at the time the plant requires them. This is particularly the case with top dressing, which relies on rainfall to wash them into the root zone or on WA sands where fertilisers are washed beyond the root zone before fertilisers can be taken up by the plant.

Fertigation, where fertilisers are applied through the irrigation supply, allows not only finer control on the mix of fertilisers applied but also the amount plants received during different growth stages.

Another method of applying fertilisers trialled within the project is the use of slow release fertiliser spikes or plugs. Plant response may depend on the placement of these whether near the surface or deeper in the root zone of the plant.



*A range of leaf symptoms have shown up in preliminary waxflower nutrition trials.*

# Good irrigation practice for waxflowers

Presenter: Kevin Seaton, Department of Agriculture

When designing a fertiliser program it is essential to have an efficient irrigation system. Tensiometer studies over the past season have shown that on sandy soils (where the majority of waxflower is grown commercially) there is very little capacity for water storage.

Tensiometers were placed at 15, 30 and 60 cm, and in some cases at 90 cm soil depth. Early in the season, water applied to the soil surface through drippers drained through the 15 and 30 cm layers and lower layers remained wet. As summer temperatures increased, plants roots drew down on water stored in the profile exhausting reserves and the soil gradually dried out. Irrigation rates were subsequently increased to keep up with demand.

## Evaporative demand

The irrigation needs of plants are not static but vary with the evaporative demand. The amount of water required by plants will depend on its location and the prevailing weather (hot east winds or the occurrence of summer showers can greatly change water requirements).

The evaporative surface area of the plant is constantly changing. Following pruning and the formation of new stems, plant growth creates an increasing demand for water. The amount of water required per plant per day can double or in some situations treble from pruning to the early autumn depending on variety.

On sandy soils it is not effective to simply add more water as the soil can only store a limited amount of water. It is far more effective to split the water application in two, a morning and late afternoon watering, and this way the water remains available to the plant and is not lost through drainage.

Use of tensiometers is a fairly cheap and low maintenance method of monitoring plant irrigation needs. Daily readings from two or three tensiometers installed at the soil surface, in the root zone and below the root zone, will tell you the exact water requirements of the plant. Keeping records of water profiles can also be an invaluable guide for designing an irrigation program and calculating future water needs from season to season.

Good irrigation management is essential to good fertiliser management of waxflower. By controlling water supply to minimise drainage you also minimise leaching and wastage of fertilisers which is a labour and cost saving.

Supplying water according to plant demand using tensiometers means that plants are not stressed and are able to maximise growth without tip burning from accumulation of nutrients in leaf tissue.



*Wax plant with three tensiometers for monitoring effectiveness of irrigation.*

# Grower experience with waxflowers

Presenter: Julie Rowe, Northampton, WA

*Review: Nikki Poulish, Development Officer, Mt Barker*

Julie and David Rowe grow a range of waxflower varieties on their 153 hectare property at Northampton to cater for regular fluctuations in market preference.

## Conflicting landuse

Northampton, like many other waxflower production areas, is located in a mixed farming area and so there is the potential for conflict of land use between neighbouring farms or even on the same property.

Herbicide use is one example of this conflict between horticultural and agricultural land use in traditional agricultural farming areas. Herbicides are one of the most common causes of cross boundary contamination (spray drift) and can result in crop damage.

The key to successful farming in any mixed agricultural area is good communication. Let your neighbours know what you are growing, what chemicals might cause damage and timings of particular sensitivity to herbicide

types if you know them. Also attention to wind direction during spray operations can prevent damage despite conflicting crops growing alongside each other.



Julie Rowe in her waxflowers at Northampton.

Understand that each farming enterprise has a right to continue, and that talking things through before there is any difficulty can help prevent future problems.

### Reporting

Keeping good records will be the key business planning and also will assist in situations of land conflict.

- **Production values** – knowing **your** production values (in terms of yield and \$/bush you make each year) will allow you to identify areas that have production concerns.
- **Inputs** – keep a record of all chemicals and fertilisers used on your own property (product name, active ingredient, rates, timing of applications, etc.).
- **Keep a diary of events** – if you see or suspect that an event has adversely affected your crop, write it all down (date, climatic conditions, etc.).

## Are waxflowers making money?

Presenter: Gerry Parlevliet, Department of Agriculture, South Perth

The WA flower industry recognised that in order to improve its production efficiency and profitability it needed to improve its understanding of cost structures and production. To achieve this the industry needed to benchmark the economic and production performance of growers

The Rural Industries Research and Development Corporation (RIRDC) with the Department of Agriculture and Flowerswest funded the project 'Improving profit in the Western Australian native flower industry through benchmarking'.

With the potential to increase exports from its current \$20 million, the industry has indicated that large improvements can be made to improve profitability by better adoption of best practice – however, few growers are in a position to identify where they are going wrong relative to others. Poor adoption of efficient systems increases environmental risks and while labour is the major cost of the flower production enterprise it does provide employment for a large number of people.

Benchmarking has been recognised as a useful tool to compare production, profitability and efficiency in many industries. The grower may feel a little intimidated but benchmarking is equally applicable to any sized enterprise.

Benchmarking is comparing the profitability/efficiency of your flower production against the performance of other growers and thereby learning how to improve your performance. This can be on a farm, crop, greenhouse or variety basis.

Cooperating growers, growing a range of native, protea and exotic flowers, collated their information, and it became clear very quickly that profitability is not high. The main cost is labour, representing up to 75% of their total operation cost. Many smaller growers had very high overheads which spread over low production resulted in negative returns.

Generally plants, fertilisers, sprays were minor costs and did not negatively impact profits, however, some of the levels of use reported suggested additional nutrient management would increase production and profitability.

Yields, varietal selling price differences, and price differences received from different exporters impacted significantly.

The results are mainly from one year but early indications from the second year data suggests exchange rates and subsequent prices for export products will impact significantly on profit.

Cost savings in labour and overheads are essential for continued viability as is improving yield to spread the overhead costs over a larger volume.

Growers, like most businesses, are busy doing their day-to-day activity and do not stand back and review their operations. They generally do not keep adequate records and certainly do not analyse the information available. Failing to regularly review their operations may result in profitability slipping and money being lost on some varieties.

The weather and exchange rate are some issues that impact dramatically but cannot be controlled – modified

maybe with shelterbelts or hedging of funds but not controlled.

On the other hand there are a host of management practices or management options that can be implemented including:

- replacing older varieties;
- changing management, i.e. mechanisation;
- improving fertiliser/irrigation and increase production;
- improving quality;
- improving labour efficiency;
- increasing production area to spread risk and fixed costs.

Having carried out a number of exercises with growers it is obvious that only the individual grower will ever be able to assess if they are profitable. There are many personal considerations, many decisions are subjective and not based on analyses of records, but records generally are not set up to enable easy cross variety comparisons.

**Table 1. Wax gross margin example**

Income	Grade 1 60 cm	600,000	100,000 (400 g)	\$2.80	\$280,000
	Grade 2 (50 cm)	400,000	30,000 (400 g)	\$2.00	\$60,000
	Total				\$340,000
Cost			Supplies	Labour	Total
	Replace plant		\$2,500	\$500	\$3,000
	Pruning			\$2,000	\$2,000
	Pest control		\$3,000	\$2,000	\$5,000
	Fertiliser		\$3,000	\$1,000	\$4,000
	Irrigation/fuel		\$10,000	\$3,000	\$13,000
	Harvest pack		\$10,000	\$95,000	\$105,000
	Transport, etc.		\$10,000		\$10,000
	Total cost				\$142,000
	GM				\$200,000
	GM/ha				\$40,000

**Table 2. Benchmark indices comparison for waxflower from survey and example gross margin**

Parameter	Waxflower survey indices	Example waxflower GM
Income per ha	\$11,000 – 52,000	\$68,000
Income per plant	\$6.54 – 30.99	\$27.20
Income per stem	\$0.15 – 0.50	\$0.34
Income per \$1 labour	\$1.41 – 4.00	\$3.30
Cost per ha	\$7,930 – 68,000	\$28,400
Cost per stem	\$0.07 – 0.36	\$0.142
Labour per ha	\$6,500 – 37,000	\$20,700
Labour per stem	\$0.04 – 0.30	\$0.104
GM per ha	\$(16,000) – 23,000	\$40,000
GM per stem	\$(0.08) – 0.14	\$0.20

Table 1 provides an example of a gross margin budget for waxflower. It provides an indication of the costs and incomes that have been achieved.

### Assumptions for gross margins

- Five hectare block – new hybrid/selection; yield 80 stem/pl \* 2500 pl/ha = 200,000 stems, total production 1,000,000 stems; bunch: grade one 6 stem/bunch, grade two – 12 stem/bunch, bunches are 400 g for export, 1000 bunch per day for five people needed for 130 days at \$100 per day each plus one allowance for manager \$30,000 = \$95,000; profit has to cover investment, depreciation, rates, interest, tax, etc.
- This is an example only: discuss your own situation with your accountant or consultant.

A series of interviews with growers also provided a set of real data, which can only be discussed as indices for confidentiality and comparison reasons. These indices can be developed to highlight the areas of importance. Table 2 compares the example with results from the study of wax.

### Some questions you may like to think about

What are the financial and production issues holding back your profitability? What is your optimum profit level? How will your enterprise develop over the next few years? How can you improve your enterprise to maximise the opportunity to sell the business to a new player? Are you in control of the enterprise or is the business in control? Do you have a business plan?

Consider keeping better records on yield by quality and price for each block/variety, number plants/hectare, costs for block/variety, labour for stages of work, i.e. maintenance, pruning (mechanical verses hand), harvest, grading and packing (time to walk from table to coolroom, time to

trim bunch in shed). How can you get your staff more productive, for example are there incentives you can offer to increase productivity?

Following the benchmarking activity the resulting advice to growers is:

Define the information you need on a regular basis to ensure increasing profitability and ensure you collect it. Then analyse the data and look for areas of significant impact that can be improved. Finally look for scope to increase labour efficiency and maximise mechanical aids and work with others in the industry to ensure prices are optimised.

# Waxflower flowering time manipulated

Presenter: Gerry Parlevliet, Senior Development Officer, South Perth

In a small trial carried out in a phytotron during summer (December to February) the impact of temperature and day length on flowering in waxflower started to become very clear. The phytotron is a growth cabinet that has both temperature and light fully controlled. This enables very good comparisons of different varieties under a range of conditions.

*Chamelaucium uncinatum* varieties (Burgundy Blush, CWA Pink, Purple Pride and Alba) were tested using plants purchased at retail nurseries – these were the only plants available and are not necessarily a good representative group but it did the job. After eight weeks in the three growth cabinets each with a different set of conditions (Table 1) the results were very spectacular. The plants were moved to the nursery under normal conditions in first week of February.

**Table 1. Three environmental conditions to test flowering time in waxflower**

Phytotron cabinet	Hours of light	Day temperature	Night temperature	
Cabinet 2	10	24°C	19°C	Shortday
Cabinet 7	10	18°C	10°C	Shortday
Cabinet 8	14	18°C	10°C	Longday

All the *C. uncinatum* plants in Cabinet 2 had some small or large buds when they were removed after eight weeks – most showed signs of flowering after 4-5 weeks. The results suggest that some plants of each



Plant on left was initiated under 24°C day temperature and 18°C night temperature with short days 10 hours of light. The one on the right failed to initiate under short days and low temperature 18°C day and 10°C at night.

of the *C. uncinatum* varieties tested had initiated and were showing first signs of flowering in week 5. The Alba type was much more uniform and is arguably a little earlier. Burgundy Blush, Purple Pride and CWA Pink budded 1–2 weeks later.

In contrast the *C. uncinatum* plants in Cabinet 7 under the same light condition but low temperatures did not show any signs of flower initiation.

A reasonable conclusion is that *C. uncinatum* flower initiates four weeks after exposure to the 10 hours light when under favourable temperature regimes. *C. uncinatum* also needs warmer temperature and around 14 hours of night (or 10 hours of day) to initiate flowering – research elsewhere suggests 13.5 hours. Cold condition restricts growth.

The waxflower hybrid ‘Purple Gem’ on the other hand showed uniform but low levels of bud formation under all conditions but only on half the plants in each cabinet. Cold conditions did restrict growth a little. ‘Purple Gem’ hybrids may behave differently and may respond to low temperature to initiate flowering, but certainly the warmer conditions and short days did not increase flowering.

This work will be ongoing to see if results can be replicated on a different set of uniform plants.



Phytotron used to carry out manipulation trial – allows control of temperature and light.

# Export market trends and quality

Presenter: Sally Sutton, Australian Flower Export Council

*Review: Nikki Poulish, Development Officer, Mt Barker*

Many native flowers grown in Australia are destined for the export market. However, Australia must compete with other countries, which also produce our native flowers. The newest player on the international market is Spain, which has recently taken over from Africa (which took over from Israel) as one of our main competitors.

In a highly competitive global market, flower quality and service quality are perhaps rated most highly by florists and buyers. Surveys have shown that long vase life is highly desirable and that florists are willing to pay up to 20% more for product that is guaranteed to last more than five days.

Three countries purchase the majority of Australian flowers, Japan (40%), USA (26%) and The Netherlands (10%). Each market has different requirements and products must be targeted differently to each market.

For example in China, the market demand is for long lasting flowers with firm stems and red is the preferred flower colour. Because of this they love *Banksia coccinea* but are not particularly interested in other Banksias.

Working with floral designers and floral architects, demonstrations and education sessions are conducted for florists and traders in new markets and with new products to encourage use and increase demand. Australia has become noticed for its creative marketing ideas using only limited budget at these events.

New varieties are the lifeline of the export industry and it is important to protect them. It has been an important discovery that only flowers that are commercially available should be exhibited in such trade displays as florists and consumers quickly lose interest if a variety is not readily available for immediate purchase and use.



*Sally Sutton at an international trade display fair.*

# Marketing options and experience

Presenter: Glennys Marsdon, The Customers Voice

Review: Nikki Poulish, Development Officer, Mt Barker

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WAXFLOWER CONFERENCE

Although most of our waxflower production is currently targeted at the export market, it is important not to trivialise the impact the domestic market could have on the hip pocket of growers.

There are currently 10 trends influencing domestic market. All of these need to be explored for their potential to expand the domestic consumption of flowers.

1. **Globalisation** – increased competition means we now have to differentiate and create value in products. Look for ways to gain customer loyalty (growers want loyal florists, florists want loyal consumers). Differentiate and create value through service, information or education.
2. **Immigration** – Australia has an aging population and decreased birth rate, and an increased immigration rate. Market segmentation of the product range available could increase market share with different flower use patterns coming with different cultural values.
3. **Pink dollar/metro-sexual** – potential for flower use by men increasing with a softer male image. Target market segment.
4. **Baby boomers** – retro or nostalgia marketing opportunities.
5. **Patriotism** – Australia Day and citizenship ceremonies are an opportunity to promote the use of native flowers, and explore the opportunity to

start new traditions. People want to buy local if all else is equal.

6. **Safety and security** – with fear of personal security, consumers want to go out less. The number and location of distribution points (florists, service stations, supermarkets, home delivery, internet shopping) could be important in their consumption.
7. **Cocooning** – with a trend for smaller houses and renovations (townhouse and inner city living), there will be an increasing demand to bring flowers into the home in place of an outdoor garden and flowers as gifts when entertaining.
8. **Time poor** – customer preference to shop local and shop at a one stop location because they are too busy to drive all over town to collect all their consumables (supermarkets, home delivery, internet shopping).
9. **Health** – with an increased awareness of health issues and alternative medicines, consumers are focused on freshness. There is an example of a Dutch Health Campaign that advertised the health benefits of flowers.
10. **Life long learning** – teaching people how to work with and present flowers (home floristry).

Careful targeting and attention to detail in each of these market segments can open the doors to endless possibilities for new ways to market our flowers.

## Early notice of Conference

The 7<sup>th</sup> Australian Wildflower Conference is being held at the Bardon Conference Centre in Brisbane, Queensland.

The conference will be held from 25–27 May 2005.

Further details are available from  
Dhane Holborn, FAQI Communication Officer  
Telephone: (07) 3824 9516 E-mail: [shane.holborn@dpi.qld.gov.au](mailto:shane.holborn@dpi.qld.gov.au)

The Conference will host seminars and workshops by leading industry people covering the latest research, industry development and growing technologies.