

THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

Report by    MARK SALTER    2004 Churchill Fellow

To study overseas developments in the  
Greenhouse raspberry production industry

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Dated

12 July 2005

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## **1. Précis and Acknowledgements**

This report details the findings from a 2005 Churchill Fellowship visit to USA, UK, Belgium and Holland investigating the production methods for greenhouse raspberry production. Specific areas of study included:

- types of growing medium/substrate
- nutrient and irrigation application
- chilling requirements for each raspberry variety
- variety options suitable for greenhouse production in Tasmania

My visit overseas and the invaluable experiences I gained would not have been possible without;

- the financial assistance given to me by Winston Churchill Memorial Trust. In addition to financial support the high regard of Churchill Fellowship helped open many doors that would have otherwise been closed.
- the support and willingness of the researchers and growers we visited who willingly gave up their time and knowledge to share with us.

## **2. Executive Summary**

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### **Fellowship Objective**

To investigate greenhouse raspberry production overseas.

### **Fellowship highlights**

1. Sow Little Farm – Madison, Wisconsin USA - visit to see their greenhouse production methods.
2. Happy Valley Berry Farm – Bridgeton, New Jersey USA – visit to see greenhouse production methods.
3. Beechfarm - Maidstone, Kent UK – Met with Mr Harry Wooldridge to view his raspberry production techniques.
4. Hughlow Farms - Kent UK – Met with Tom Clark to view large greenhouse raspberry production.
5. Cyril and Simon Rogers – Brookland, Kent UK – Viewed greenhouse raspberry production methods. Have been producing greenhouse raspberries for over twelve (12) years.
6. East Malling Research Station – East Malling, Kent, UK – Met with Vicki Knight and discussed various aspects of their breeding program and production methods.
7. Scottish Crop Research Institute – Invergowrie, Scotland – Met with Dr Rex Brennan and discussed aspects of their breeding program and various production techniques, including chilling requirements. Also met with Dr Stuart Gordon, Entomologist - discussed Integrated Pest Management techniques.
8. Viking Tunnels- Perth, Scotland – Met with David Leslie – viewed greenhouse raspberry production.
9. National Research Centre – Meerle, Belgium – Met with Filip Lieten and viewed greenhouse and tunnel production for both strawberries and raspberries as well as introductions to growers.
10. PCF – National Raspberry Research Centre, Hasselt, Belgium – Met with Fanny Pitsiudis and discussed greenhouse raspberry production techniques as well as viewing their research institute as well as introductions to a number of growers.

## **Findings**

There is potential for greatly increasing current yields as well as higher quality fruit. The Benefits include:

- Increased yields
- Higher quality fruit, including better shelf life
- Less reliance on chemical pest and disease control
- Guarantee continuity of supply to customers, as greenhouse production is not so weather dependent.

## **Dissemination of Information**

- Address Rubus Growers Association when required
- ABC Country Hour radio interview Thursday 26 May 2005
- Grower field days

## **Implementation of Findings**

My findings will be introduced into our greenhouse business. A number of trials are to be conducted during the 2005 growing season as a result of information gathered from my overseas study trip.

### **3. Programme**

#### **Madison, Wisconsin USA**

**6 - 8 April 2005**

- Sow Little Farm, Terry Cohn & Michael Johns

#### **Bridgeton, New Jersey USA**

**10 - 12 April 2005**

- Happy Valley Berry Farm, Shirley Kline

#### **Kent UK**

**16 - 20 April 2005**

- Beech Farm, Mr Harry Wooldridge
- Langdon Manor, Mr Alastair Brooks
- Hughlow Farms
- Brookland Farms
- East Malling Research Station, Dr Vicki Knight

#### **Norfolk, UK**

**20 - 22 April 2005**

- Place UK, Mr John Place, Mr Tim Place

#### **Scotland**

**23 - 27 April 2005**

- Viking Tunnels, Mr David Leslie
- Scottish Crop Research Institute, Dr Rex Brennan, Dr Stuart Gordon

#### **Belgium**

**30 - 10 May 2005**

- National Research Centre, Filip Lieten
- National Raspberry Research Centre, Fanny Pitsiudis
- Meerle Fruit Co-operative
- Timmemans Fruit Farm

## **4. Introduction**

### **Background**

The Australian Rubus industry is primarily based on outdoor production (grown in soil), with a small number of growers using rain covers which protect the crop from wet weather. The use of green houses and plastic tunnels is only beginning to be used, with only a very small production grown under green house conditions.

At present, the Australian Rubus Industry produces around 450 tonnes per annum. The majority of production occurs in the states Victoria, Tasmania and New South Wales.

## **5. Green House Raspberry Production findings**

### **Green House Production Technics in the USA**

Generally, the greenhouse production in the United States is still in its early stages of development with reasonably small farms now commercialising research carried out by Cornell University, New York State.

#### ***Wisconsin***

The growers I visited in Madison were producing in hoop houses or tunnels. Varieties in production included Autumn Britten and Tulameen, as well as a small quantity of Purple Royal. The raspberry canes were grown in 30litre plastic tubs with six (6) to eight (8) canes per tub. The growing medium that was being used for the canes consisted of an organic peat mix together with an organic slow release fertiliser and hand watering twice per week, and their main aim is to produce organic fruit.

#### ***New Jersey***

Production occurred mainly in greenhouses and high tunnels. The grower was producing in 25 litre pots with 4 canes per pot, as well as production of canes in the soil. The growing medium used was a mixture of peat and composted pine bark, which appeared to have very good air porosity and was also free draining. Varieties consisted of Caroline, Josephine, Heritage, Autumn Britten and Tulameen. This farm was in the process of conducting comparisons between primacane varieties in the soil and flurricane varieties in pots. Their findings, to date, indicate that flurricane varieties cannot be planted in the ground because of the chilling requirement not being able to be achieved in a greenhouse. Flurricane varieties need to be chilled outside the greenhouse or in an artificial environment ie: coolstore/coolroom. Therefore, the raspberry canes need to be propagated in pots so they can be easily transported in and out of the greenhouse. The farm has also been experimenting with placing flurricane varieties such as Tulameen in an insulated shed which can be opened at night to allow cool air to circulate then close at sunrise to retain the cool environment (below 7 degrees C). This is a relatively cheap and effective means of artificial chilling, although, this system does require very cold nights and cool days.

At present the fruit produced on this farm is primarily for the local market for the months of June, July and August. As there is very little competition from outdoor production in the New Jersey area, which provides the opportunity to maintain good prices for

raspberries, right through the summer period. The farm has also been experimenting with techniques to spread the production over a longer period. This has been achieved through tipping the primocanes at certain growth periods to retard fruit production. The technique involves tipping the primocane 1 inch on or about the third week of June when growth has begun to slow. Tipping 1 inch will retard fruit production by approximately 1 week. Pruning 2 inches will retard fruit production by 3 weeks with no more than a maximum of 25% of the cane to be removed.

## **Green House Production Technics in the UK**

### ***Kent***

The main production areas of the England are in Kent and the South East. Raspberry production mainly occurs in Spanish Tunnels with the canes planted in the ground. This technique is very popular because of its low establishment costs and relatively high yields, but this type of growing only extends the season by a maximum of 2 months. There is a lot of interest in greenhouse production, particularly, to extend the growing season.

I visited a number of greenhouse producers in the Kent area. One operation we visited are large outdoor growers and have recently branched out into greenhouse production. Their operation is currently leasing a 7acre glasshouse complex. The production technique involves growing in 10 litre pots with 1-2 canes per pot using a coarse peat mix as their growing medium. Varieties include Tulameen and Glen Ample. Production expectations are approximately 320g per cane for Glen Ample, whereas Tulameen is expected to produce 220g per cane or 440g per pot, with two seasons from each pot. In total, there are approximately 80,000 canes in production and expect to increase this number next year. The canes are introduced into the glasshouse around the 1<sup>st</sup> week in January with harvest beginning late April. Watering and climate control is carried out automatically by computer.

While in Kent I visited Dr Vicki Knight at the East Malling Research Centre. The East Malling Research Centre has been involved in raspberry research for many years, both in terms of breeding new varieties and fruit production techniques. We discussed watering requirements for raspberries, in particular, the preference for potted canes requiring a medium that has good air porosity and water holding capabilities without becoming water-logged and too wet. Also discussed was the necessity for tipping long canes, particularly Tulameen. Also discussed different varieties suitable for our growing conditions and area.

### ***Scotland***

My visit in Scotland included Dr Rex Brennan, Scottish Crop Research Institute, Invergowrie. Here we discussed techniques for year round soft fruit production with regard to raspberries. The majority of their research has focussed on long cane production systems whereby the fruiting season is extended by manipulation of the dormancy cycle of the plant through cold storage. *\*(Refer article)*. We also viewed the Institute's farm and looked at potential new varieties that may suit our growing conditions.

Dr Stuart Gordon, Entomologist - discussed Integrated Pest Management techniques for raspberry production. He outlined that the main insect pests are raspberry beetle, raspberry aphids, raspberry cane midge, two-spotted mite, raspberry moth, and clay

coloured weevil. The main three for protected raspberry cultivation are the raspberry beetle, raspberry cane midge. Options for control of these pests include chemical, and integrated pest management. Integrated pest management is an important tool for pest and disease control because it allows the use of beneficial insects and minimises chemical inputs.

*\*\* (Refer article)*

While in Scotland I also had the opportunity to visit one of the largest small fruit producers in Scotland who produces strawberries, raspberries, red currants, black currants, gooseberries and rhubarb. I viewed their greenhouse raspberry production which is mainly for the local market. Greenhouse raspberries are grown in 7 litre pots with 2 canes per pot using coarse peat as the growing medium, which was not overly wet. The main variety grown is Glen Ample.

### **Green House Production Technics in the Belgium**

During my visit in Belgium, I met with Fanny Pitsiousis at Proefcentrum voor Fruitteelt (PCF) research station to discuss techniques for greenhouse raspberry production. Research station is mainly trialing and growing the Tulameen variety as this is the most popular variety in Belgium. One of the key recommendations given by the research station was to start with the best quality planting material where possible. When planting bare-rooted long canes care should be taken not to source canes where the plantings have been too dense. The ideal density for nursery canes is approximately 20 to 25 canes per metre. High nursery cane density results in poor quality canes which, in turn, leads to poor bud development. Also, another drawback with bare-rooted canes is the development of laterals before adequate root development. Nearly all growers in Belgium are growing their own plants either from tissue culture or root pieces. Each cane should achieve approximately 15 laterals per cane.

The most commonly used growing medium in Belgium is a coarse peat mix, which is preferred because of its free draining properties. Generally, growers can achieve three (3) years production from the same plant and growing medium, but it is now generally recognized in Belgium that production will drop each year by approximately 25%. Hence, most growers are now only growing the same plants for 1-2 years and achieving higher yields.

Trellising is a very important aspect for producing large volumes of high-grade fruit. The correct trellising methods help to create more airflow and to better light penetration and therefore produce better quality fruit. Also, good trellising techniques helps increase picking speed. The research station was using nine (9) strings each side to hold the laterals and had a row spacing of 2.13 metres.

Irrigation is another important aspect of raspberry production in the greenhouse. With all growing medium it is important that the substrate is not too wet as water-logging will inhibit root development. Watering can vary with climate changes and it is necessary, from time to time, to check the root-ball to make sure it is not too wet.

While at the research station I viewed their coolstore facility and saw Tulameen under chilling at -1.5 degrees c. Chilling requirement for Tulameen is approximately 1100 hours. Pots and canes were stored in bins. Cold storage for raspberry canes in Belgium

begins in January until end April.

## **6. Conclusion**

To maximize greenhouse production for Raspberries my findings include the following observations:

- Use only the best quality planting material available, whether the material is long canes produced in the field, or alternatively tissue cultured plants, also root pieces.
- Use a free draining growing medium to minimize water logging. Careful monitoring of irrigation to provide optimum moisture levels.
- The minimum chilling hours for all varieties of raspberries must be achieved before introducing them to the greenhouse.
- The varieties Tulameen and Glen Ample are still the main varieties producing in the UK and Europe, mainly because of their yield and flavor.

## **7. Bibliography**

\* *Final Project Report CSG15 – Year-round soft fruit production with regard to raspberry and blackberry*  
Scottish Crop Research Institute.

\*\* *Anthropod pests of Rubus in Europe: Pest status, current and future control strategies*  
by S.C Gordon, J.A.T Woodford and A.N.E Birch – Scottish Crop Research Institute,  
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