Selecting Suitable Grapefruit Cultivars for Commercial Production in Central Australia

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Introduction

The information provided in this Information Sheet was gathered from a four year Red-flesh grapefruit trial conducted by the Department of Primary Industry, Fisheries and Mines (DPIFM) at the Arid Zone Research Institute (AZRI) in Central Australia. The trial was conducted in conjunction with a national trial being coordinated by the South Australian Research and Development Institute (SARDI). Alice Springs was selected as one of the trial locations believed to have potential for future development.

The purpose of this trial was to determine areas suitable for the commercial production of Red-flesh grapefruit throughout Australia. Plantings were established in both existing citrus production areas and those with potential for future development.

This Information Sheet outlines the results of a four year research trial into the suitability of Red-flesh grapefruit cultivars to Central Australian growing conditions and includes:

- Cultivar characteristics
- Average yield per cultivar
- Fruit characteristics
- Best cultivars
- Conclusion

Summary

- This trial was conducted as part of a national trial coordinated by the SARDI.
- Trial plantings of seven cultivars on two different rootstocks were established at AZRI and Ti Tree Research Farm (TTRF).
- Although the results show only slight differences between each scion/rootstock combination in terms of maturity times, it did show that fruit matures readily in April with most fruit meeting market standards on average.
- Ruby Pink on Carrizo Citrange, and Rio Red on Swingle were best performers when considering fruit number per tree and tree yields, and would be the most suitable selections for commercial production.

Background

The decision to start such an extensive trial was made after it became increasingly clear the demand for fresh Red-flesh grapefruit with consumers in the United States, Israel, Western Europe, and more recently Asia, was rapidly growing. The Australian horticulture industry believed there was the potential for Australia to export up to 100,000 tonnes of Red-flesh grapefruit to these countries annually.

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Published November 2006

Research Planting's

Arid Zone Research Institute (AZRI)

Individual variety and rootstock combinations were planted in single tree plots with four replicates of each combination planted in random order.

The trial planting of grapefruit at the AZRI in Alice Springs was established in 1995. The trial consisted of five pink or red-fleshed varieties; Ruby Pink, Henderson, Ray Ruby, Rio Red and Star Ruby. There where also two white-flesh varieties planted; Marsh and Oroblanco (a low acid variety). All seven varieties were trialled on two different rootstocks; Swingle and Carrizo Citrange.

Preparation for the planting commenced in the middle of April and planting took place in July 1995. There were 56 trees planted, with a surrounding guard row consisting of lemon and orange cultivars.

Ti-Tree Research Farm (TTRF)

Demonstration plantings of grapefruit were also established at TTRF, located 190 km north of Alice Springs. The planting at TTRF consisted of two trees of each variety. One tree of each variety was grown on Carrizo Citrange and the other on Swingle.

Cultivar Characteristics

Data collected during the evaluation of the varieties included maturity times, average yields per cultivar and fruit quality characteristics.

Maturity times

The average maturity time of a specific cultivar will greatly influence the financial return from national or international markets. It is believed that Central Australia could provide grapefruit growers with a market opportunity to produce quality fruit at the end of the tropical season and before the southern, more temperate, regions begin harvest.

Average maturity times are determined through the calculation of both the sugar/acid ratio and juice percentages of the fruit. The National Standards state the sugar/acid ratio for grapefruit is to be a minimum of 5.0: 1 and the juice percentage to be a minimum of 33%.

The results provided below (Table 1) show the average sugar/acid ratio for each scion/rootstock combination over a four year period. Although these results show only slight differences between each scion/rootstock combination, it does show that fruit matures in April with most cultivars meeting market standards on average.

Table 1. Averaged maturity data for the 14 variety/rootstock combinations

Scion/ Rootstock	Average Juice Percentage		Average Brix/Acid Ratio	
	April	*May*	*April*	*May*
Ruby Pink/Swingle	42.5	47.35	5.5	6.98
Ruby Pink Carrizo Citrange	40	45.3	6.3	7
Henderson Swingle	43.4	48.5	5.7	7.08
Henderson/Carrizo Citrange	41	47.4	6.1	7.1
Ray Ruby/Swingle	44.1	48.58	5.3	7.8
Ray Ruby/Carrizo Citrange	41	46.1	5.6	7.1
Rio Red/Swingle	40.6	46.48	6.3	7.55
Rio Red/Carrizo Citrange	42	48.1	6	7.2
Star Ruby/Swingle	44.8	48.2	5.8	7.47
Star Ruby/Carrizo Citrange	41	45.9	5.8	7.9
Marsh/Swingle	39.2	44.98	5.5	6.33
Marsh/Carrizo Citrange	39	44.25	6	8.1
Oroblanco/Swingle	29.3	31.5	12.5	13.95
Oroblanco/Carrizo Citrange	30	35.7	16.2	16.5

Average Yields per Cultivar

The information provided in the graphs below represents both the average fruit yield in kilograms and overall fruit count for each of the scion rootstock combinations. When selecting a scion/rootstock combination for production purposes, it is essential these two factors be considered. In most cases a scion/rootstock combination that produces both a high number of fruit and a high corresponding yield weight is suitable. From the scion/rootstock combinations trialled, Ruby Pink on Carrizo Citrange and Rio Red on Swingle consistently met the above criteria.

Figure 1. Average fruit yields per tree.

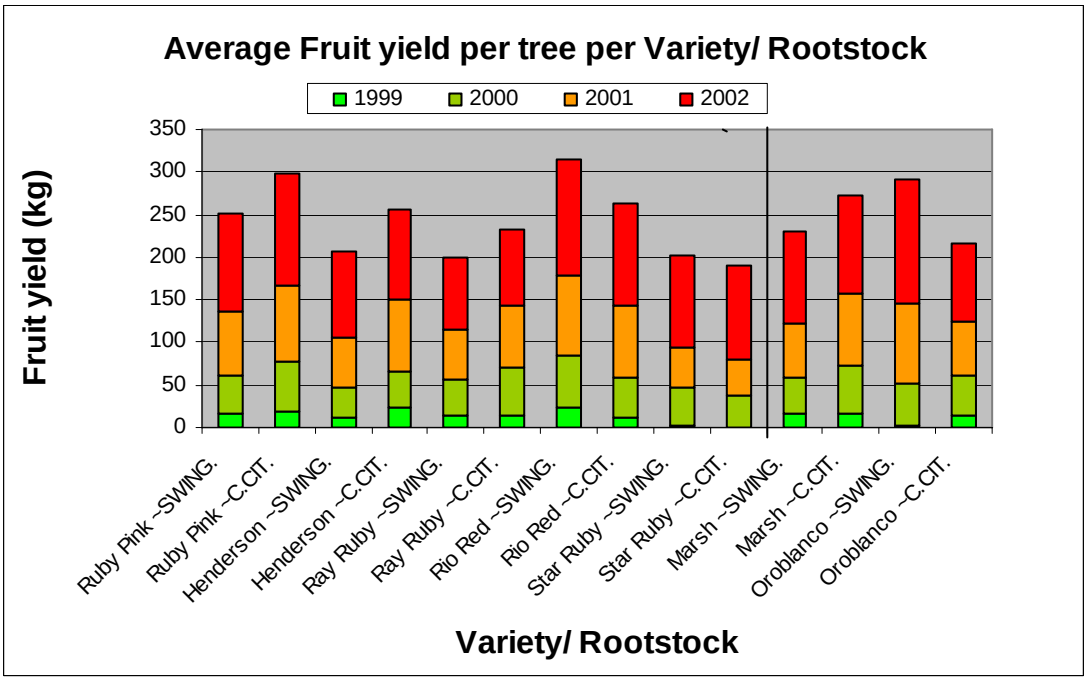
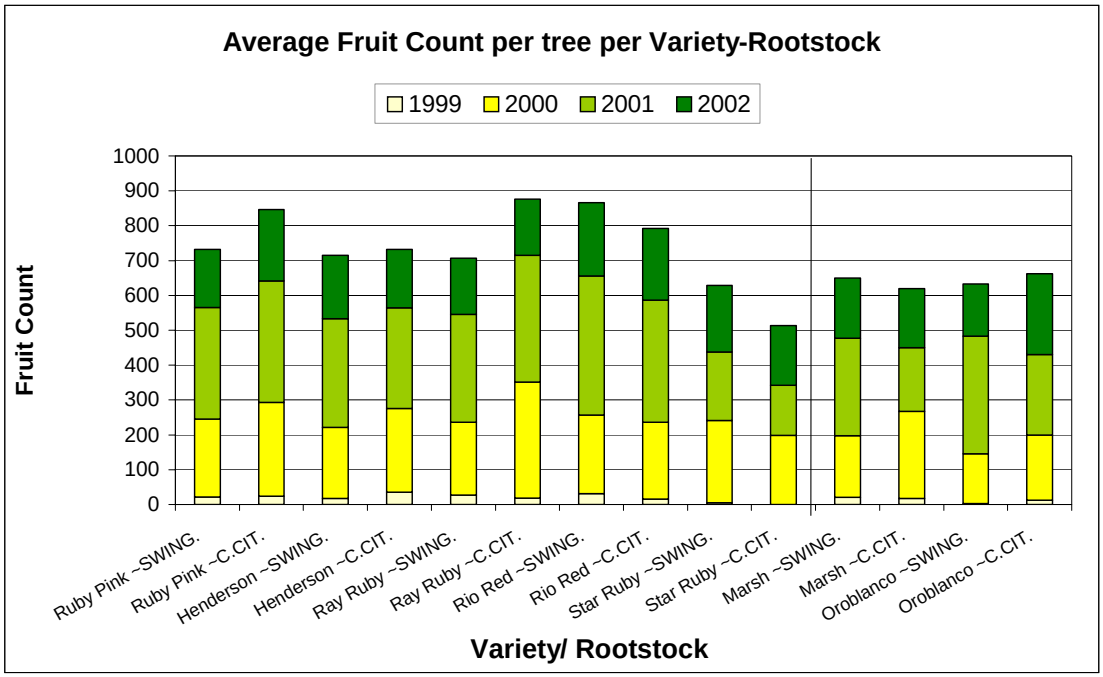


Figure 2. Average fruit count per tree.



Fruit Characteristics

The fruit characteristics of a selected cultivar will also play a major role its overall marketability. Below is a list of three important factors that contribute to overall fruit quality. Under each of these sub-headings is a short description of some of the observations and findings collected form the trial.

Internal and external colouration

There are two main factors that may contribute to the internal and external colouration of Red-flesh grapefruit. The first and possibly most influential factor is climatic conditions. A cool dry climate will in most cases promote well coloured fruit both internally and externally. Central Australian climatic conditions are ideal for skin and flesh colour. The intensity of fruit colouration, in particular external colouration, can also be influenced by a given variety's natural pigmentation. This fact was observed throughout the course of the Red-flesh grapefruit trail. Though all cultivars were exposed to the same climatic conditions Ray Ruby, Star Ruby and Rio Red all produced fruit with intense external colouration while Henderson and Ruby Pink only developed a very light external blush.

Average Rind Thickness

All ten of the red-flesh scion/rootstock combinations consistently produced fruit with an acceptable rind thickness of 9 mm with the Henderson and Star Ruby cultivars producing fruit with rinds as thin as 5 mm.

Rind thickness can be influenced as much by management practices as actual cultivar characteristics. Nutrition management after fruit set can prevent cultivars producing fruit with excessive rind thickness.

Average Seed Count

Although the number of seeds contained in the fruit may not seem as significant as fruit colouration and rind thickness it remains an important part of overall fruit quality. The less seeds contained in the fruit the more attractive the fruit is to the consumer. The average seed count for each scion/rootstock combination was around 3 to 4 per fruit, regardless of the scion/rootstock combination.

Best Overall Cultivars

Trial results indicate Red-flesh grapefruit cultivars are well suited to Central Australian growing conditions. All ten combinations performed well. Two of the ten combinations however, consistently outperformed all other combinations. Rio Red on Swingle rootstock and Ruby Pink on Carrizo Citrange rootstock consistently produced higher numbers of fruit per tree than any other scion rootstock combination. Both combinations also performed well in terms of average maturity times and overall fruit characteristics. When selecting grapefruit cultivars for commercial production in Central Australia, Rio Red on rootstock Swingle and Ruby Pink on Rootstock Carrizo Citrange may be the most suitable choices.