

**Making good variety investment decisions.
A Tree Fruit Variety Evaluation Program
for Australia**

Russell Soderlund
Factree

Project Number: MT10051

MT10051

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Cherry
Summerfruit

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MT10051: “Making good variety investment decisions. A tree fruit variety evaluation program for Australia”

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Research Provider: Graham’s Factree Pty Ltd

Date: June 2014



Horticulture Australia

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Horticulture Australia Project Number: MT10051

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Purpose

This report is the Final Report of the project known as MT10051 "Making good investment decisions. A tree fruit variety evaluation program for Australia"

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Date

30 June 2014

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1. Media Summary

Imagine fragrant, rich coloured summerfruits with unique shapes, skin colours and flavours, tempting consumers to try them.

Imagine consumers trying these novel fruits and being so excited by them that they rush back to the stores for repeat purchases.

That is the potential of the Graham’s Factree summerfruit and cherry variety evaluation project – identifying innovative new varieties that are easy to grow, look great on the supermarket shelf and are great to eat.

The project evaluates nearly 1000 new summerfruit and cherry varieties at a range of sites across Australia. Included in these are exciting interspecific varieties – crosses between apricots and plums – that take on some of the characteristics of both parents. These interspecific varieties are fruits with new appearances, flavours and textures that, in general, are very good to eat.

As well as the interspecific varieties the project evaluates conventional peach (yellow fleshed and white fleshed), nectarine (yellow fleshed and white fleshed), cherry, apricot and plum varieties. A grower growing all these fruits requires 80 or more varieties for the year. Accordingly, there is always room for a better performing variety at a particular time of the season. This is especially the case for very early and very late varieties - that are often planted because nothing else is available for that time.

Overall the project sets out to address one of the key risks a grower faces – the risk of planting a variety that doesn’t perform well in his or her production region. Orchard establishment costs are around \$50,000/ha after the cost of the land, water and irrigation infrastructure. This money is wasted if the variety doesn’t perform well and the trees need to be removed after a few years. By providing all Australian growers with robust information about the performance of a variety in the grower’s region, the project is helping growers manage this “wrong variety” risk.

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2. Technical Summary

By planting a wide range of material in four key production regions and making the results of the evaluation readily available to all growers, the project goes a long way to addressing one of the major risks a grower faces – that of planting the wrong variety for the timeslot in his/her region.

MT10051 is a substantial project spread literally across Australia. During the course of the project 983 individual varieties of summerfruit and cherries have been planted at the Primary and Secondary summerfruit and cherry sites (Tables 2 and 3). The vast majority of these are summerfruit. The secondary evaluation sites are now coming on stream. Secondary summerfruit sites, containing around 100 varieties have been planted at Shepparton, Swan Hill and in the Perth Hills. As well, secondary evaluations are conducted on the trees planted in the summerfruit primary site located at Renmark. The varieties planted at the secondary sites were chosen by the local evaluators (with assistance from Factree) as varieties that, after primary evaluation, show commercial potential for that region. Cherries are not as far advanced with 61 varieties at the Primary Evaluation Site at Wangaratta, 21 at Young, 22 in the Dandenong Ranges and 51 in the Adelaide Hills. At the end of the project, the cherry sites had not yet started to produce significant volumes of fruit that could be taken as representative of the varieties.

There have been a total of seven hundred and seventy seven (777) Phase 1 evaluations and six hundred and two (602) Phase 2 evaluations completed under the four year term of this Project.

At the time of writing this report, there have been seven (7) new varieties commercialised in 2014, twelve (12) new varieties that are presently undergoing commercial scale testing (that is testing in commercial orchard plots involving 50 plus trees of the variety) and more than forty (40+) further new varieties being tested by commercial growers.

The distinguishing competencies of the project are as follows:

Experimental design. Because of the large number of varieties being evaluated, a statistical rationale is not utilised. Replicating the plots would require land and labour far beyond the resources available and introduce a high level of complexity into the program – possibly making it too complex for the “lay” evaluators currently used. Instead the rationale is:

- Phase 1 evaluation identifying characteristics that would make the variety non-commercial in Australia (e.g. small size, a tendency to fruit cracking or russet etc.) but also giving some indication of time of ripening relative to other varieties. Phase 1 evaluation is effectively a “pass/fail” evaluation;
- Phase 2 evaluation (similar to that which a grower would use on their own property) is carried out in the main production regions by competent evaluators trained (and using a strict evaluation protocol) so that they report fruit characteristics in the same way.
- Standard varieties included at all sites to capture time of ripening and other differences between regions

The results of the evaluations are made freely available to all growers. The results of the program are available via the Factree website to all growers. The Annual Report is also posted to all growers on the Factree customer list free each year. As Factree is a major supplier of

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summerfruit and cherry trees, their customer list includes the overwhelming majority of summerfruit and cherry growers in Australia. As noted above, the project works hard to disseminate the evaluation data it collects.

A number of varieties have been planted at more than one secondary site. This will allow the impact of regional environments to be understood. The important differences will be in the timing of maturity and fruit quality between regions. This information will allow growers to select the best variety for their region for the timeslot they are considering.

The project team is not aware of any other Australian program that publishes these “Genetics x Environment” interactions for summerfruit or cherries.

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3. Introduction: the "wrong variety" risk

The importance of varieties to fruit production is well recognised. Varieties can make a very significant difference to the seasonality, appearance, eating quality, shelf life and other attributes of the fruit. These attributes are important commercially as they sum to commercial points of difference that allow promotion and differentiation in the minds of consumers.

There are many fruit breeding programs in the world. A Google search on "stone fruit breeding" identified more than 10 stone fruit breeding programs, from all over the world including Australia, in the first two pages of 63,000 hits. The same applies to other fruits. Many of these varieties are available in Australia.

For the grower, the most difficult question to answer is "Which varieties are the best for my enterprise?" This is a complex question involving aspects of market, production region, seasonality, agronomy and postharvest handling. Fundamental to such decisions are awareness of varietal options and simple-to-use information about them.

Often Australian climates, soils and agronomic practices differ to those of the countries where the varieties have been developed. Australian markets are also different to those overseas. While there are some general correlations between the success of varieties in Australia and the regions in which they are bred overseas (e.g. stone fruit varieties bred in central California usually perform well in Australia's Murray Valley region) there is absolutely no guarantee that a variety from overseas will perform well in Australia. The risks relate to differences in seasonality (which can make a large difference to the commercial value of the fruit), fruit quality (colouring and eating quality) and to storage and shelf-life characteristics.

These differences necessitate rigorous evaluation in Australia, in the major production regions, prior to being planted by Australian growers. **In fact, planting the wrong variety, for their region and the intended timeslot, is one of the largest risks a grower faces.**

In the past, variety evaluation programs were run by State Agriculture Departments. With the rise in proprietary licensing of varieties and cut backs in government funding, such programs have now completely disappeared.

MT10051 is one of very few evaluation programs that completely disclose the results of all evaluations conducted. Though the Factree website and through the project's Annual Report, **all** growers can access **all** the data we collect in the project.

I am pleased to be able to present this Final Report for MT10051.



Graham Fleming
Managing Director
Graham's Factree Pty Ltd

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4. Materials and Methods

4.1 Project Structure

The structure of the project, for summerfruit, is presented in Figure 1 and described below. The structure for cherry variety evaluation is similar with the Primary Site being in Wangaratta and Secondary Sites being in the Adelaide Hills, Southern Victoria and Young NSW.

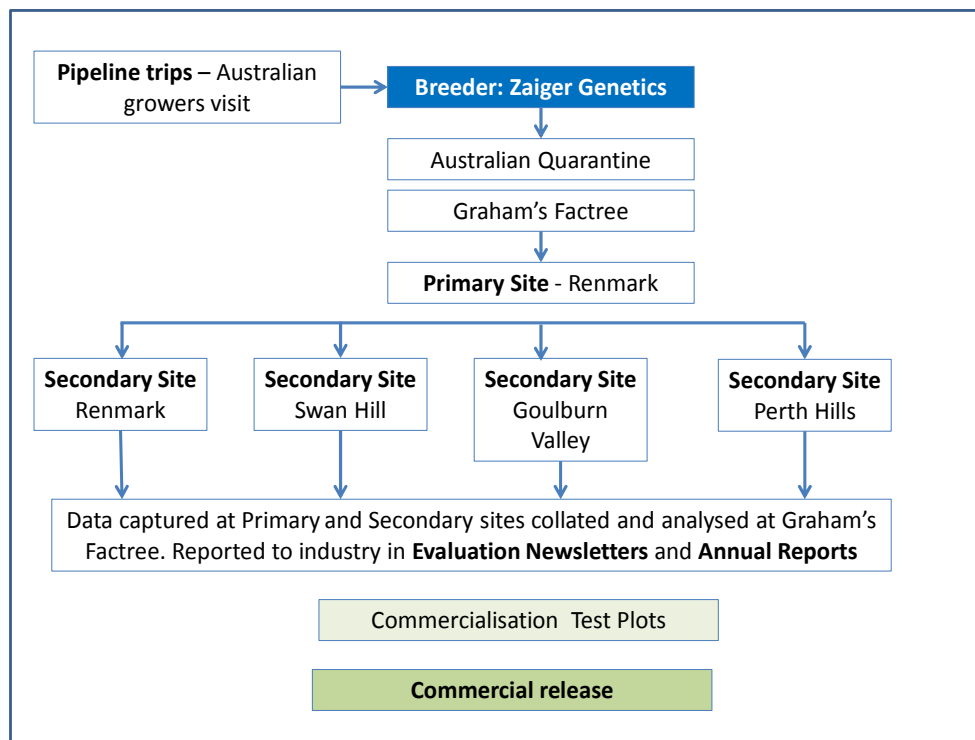


Figure1: Program structure for summerfruit

The project starts with the **Pipeline Trips** where suitably qualified Australian growers and other industry personnel visit the breeding plots at Zaiger Genetics in Modesto, California. Each year, the grower participants in the Pipeline Trips, together with Graham's Factree staff, identify the next generation of peaches, nectarines, plums, apricots, cherries and interspecific varieties to be imported into Australia.

The chosen varieties come into **Australian quarantine** and after being shown to be free of known viruses are released to Graham's Factree for initial propagation. Initially, trees are propagated for the **Primary Site** at Renmark (Wangaratta for cherries). Over the first few years of the project a wide range of interspecific summerfruit varieties were also evaluated at the Summerfruit Primary Site.

The evaluation at the Primary Site is of a “pass or fail nature” with only varieties with significant faults being eliminated. Varieties showing no serious faults are promoted for more detailed evaluation at the **Secondary Sites** in Renmark, Swan Hill, the Goulburn Valley and the Perth Hills.

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All Secondary Sites now have quite a range of varieties planted (see Table 2) and all Secondary Sites will bear fruit in the 2013/14 season.

Data collected at the Primary and Secondary Sites are collated and analysed at Graham's Factree and published (for access by the whole industry) in the (approximately weekly) **Evaluation Newsletters** and **Annual Report**. Only data from Secondary Evaluations are published in the Annual Report.

Varieties of particular interest are provided to growers in **Commercialisation Test Plots** and commercial evaluations by the grower on their property are conducted. Varieties that pass Commercial Evaluation are promoted for **Commercial Release** to the industry.

4.2 The Pipeline Trips

The Pipeline Trips seek to harness the knowledge and experience of Australian growers to help select the varieties to bring into Australia. The Pipeline Trips take Australian industry members to Modesto, California, where the Zaiger breeding program is located.

The visit has two main components:

Attendance at the Zaiger Genetics weekly Variety Showcase where the Pipeline participants have the chance to walk the breeding plots with the staff of Zaiger Genetics. This gives a chance to evaluate the fruit characteristics (size, appearance, taste, texture, etc) and tree characteristics (crop load, vigour, habit etc) of new varieties.



Figure 2: Evaluating fruit during a Showcase.

Visits to other members of the supply chain dealing with the Zaiger varieties. These visits give a chance to obtain feedback about particular varieties from nurseries producing trees, growers producing fruit, packer/shippers presenting fruit for market and distributing it nationally. This experience adds greatly to the commercial relevance of a variety recommendation.

As can be seen from Figure 1, releasing a new variety is a slow and expensive process. It takes a number of years to go from identifying a variety with potential overseas, to bringing it through quarantine in Australia,



Figure 3: Showcase at Zaiger Genetics

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to evaluating the variety in Australia and eventually producing fruit for sale. The experience of the participants in the Pipeline Trips helps Graham’s Factree to select the best varieties to be imported and to avoid importing lesser varieties.

There is much to choose from. In an average season of Showcases, Zaiger Genetics can present between 25 and 60 varieties a week depending on the time of the season. Over a full season, this equates to literally hundreds of varieties that could be given consideration for importation into Australia.

Commercial reality allows the importation of “tens” of varieties each year – not 100’s. Narrowing down the pool to choose from is done with help from Zaigers themselves and the experienced Australian people on the Pipeline trips

To cover most of the season, the Evaluation Project has the capacity for ten Pipeline Trips each year. Each trip is partly funded by the project but also requires a financial contribution on behalf of the person taking the trip as well as a commitment to represent the Project Team in a professional manner. Each participant must provide detailed fruit evaluations, photos and reports outlining their findings and recommendations back to the Project Team.

The Pipeline Trips provide an invaluable opportunity for industry to become involved in selecting varieties to import into Australia. The trips also provide growers with a chance to travel overseas to view new variety selections and to experience the California summerfruit industry.

Reporting the Pipeline Trips

Over the term of the project, the Factree team has worked on ways to get the best from the data collected in the US. The main outputs from the Pipeline Trips are:

- recommendations to Factree as to which varieties should be imported
- letting industry know of the varieties (and their attributes) that are entering the Factree pipeline

To address the latter issue, and for the 2013 trips onwards, Factree prepared PowerPoint presentations of the data collected during each trip. These reports are mainly pictures and as such end up as large files. Accordingly they are best viewed on line. An example can be found at

Pipeline Evaluations 2013 J. Size - <https://docs.google.com/presentation/d/19IUgHAa4EIG53JdpHXENHc-Qi3h5aOU9Fhc4myw6Eu4/edit?usp=sharing>

For the 2014 Pipeline trips (which will not be completed by the time of this Final Report), Factree will make a separate report available to HAL.

4.3 Primary and Secondary Evaluation sites for Cherries

The program structure for cherries is exactly the same as that reported in Section 4.1 for summerfruit. However, as would be expected, the various sites are located in different production regions. The location of the sites is as follows:

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Primary Site: Wangaratta, Victoria
Secondary Sites: Dandenong Ranges (Silvan) Victoria, Adelaide Hills, South Australia, Young, New South Wales. A Secondary Evaluation site for cherries is also intended for Tasmania but has not yet been planted

4.4 Evaluators and Industry Associations

Table 1 below describes the industry association under which each site is contracted and the names of the evaluators at the site. Evaluators were chosen on the basis of

- their interest in varieties
- their ability to consistently collect and report reliable evaluation data
- their understanding of the need for evaluation and their commitment to the evaluation project

Note that not all sites were contracted through a local association – in some cases the local association did not wish to be involved.

Table 1: Details of the Primary and Secondary sites for summerfruit and cherries

Region	Varieties evaluated	Regional Association	Evaluator
Renmark, SA	Primary and secondary sites for summerfruit	SAFFGA, Quality Fruit Marketing group	Jason Size
Perth Hills, WA	Secondary, summerfruit	Hills Orchard Improvement Group	Jeff Ghiladucci, Wayne Ghiladucci
Shepparton, Vic	Secondary, Summerfruit	Fruit Growers Victoria	Michael Crisera, Rocky Varapodio
Swan Hill, Vic	Secondary, summerfruit	-	Jeff Sibley
Wangaratta, Vic	Primary, cherries	Victorian Cherry Association	Tim Jones
Young, NSW	Secondary cherries	-	Geoff Hall
Dandenong Ranges, Vic	Secondary, cherries	Victorian Cherry Association	Steve Chapman
Adelaide Hills, SA	Secondary cherries	Cherry Growers Association of SA	Ian Sparnon

The Project Team was disappointed that the Secondary Cherry site planned for Tasmania was not planted in winter 2013. After long and encouraging discussions with a leading Tasmanian cherry grower about the site, the grower decided not to proceed. This was in late winter 2013, by which time it was too late to identify another site for 2013 planting. Factree has not been able to find another possible site (in northern Tasmania) at this point in time – despite trees being worked and available.

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4.5 Numbers of varieties evaluated or under evaluation

Summerfruit

The total number of varieties in the Primary and Secondary sites (in 2013/14) is provided in Table 2 below as is the number of evaluations conducted at the site in the last year of the project. The number of evaluations basically reflect the ages of the trees at the various sites.

Table 2: Number of evaluations conducted in 2013 / 2014 and the number of varieties planted by site – at the end of the project

Evaluations Conducted 2013 / 2014					
	Primary Site	Secondary Sites			
Crop type	Renmark	Renmark	Perth Hills	Shepparton	Swan Hill
Apricot	4	6		1	
Complex Interspecifics	8	7			
Interspecific Apricot	13	9			
Interspecific Plum	71	59			
Plum	3	2		1	
White Nectarine	26	30	5	3	
White Peach	50	52	2	3	2
yellow Nectarine	32	42	12	4	5
yellow Peach	49	51	8		4
Total Evaluations 2013/ 2014	256	258	27	12 *	11 *
Total Varieties Planted at end of Project	514	(Included in Primary site total)	99	99	116

* Note: Due to the immaturity of the trees in the Swan Hill site that were evaluated, only the evaluations that were based on sufficient fruit quantity sample size to confidently validate findings were retained in the database. Details for Shepparton site evaluations confirmed by evaluator at the time of compiling this Final Report but input of data into project database pending.

Cherries

Cherries take an additional year or so to come into production compared to summerfruit. Usually fruiting starts in the third or fourth leaf. At the end of the project, none of the cherry plantings, at either the primary or secondary sites, were fruiting sufficiently to warrant evaluations and so there were no evaluations conducted for cherries during the project. However, a good number of trees were planted in the various sites. Table 2 gives an indication of the number of varieties planted.

Table 3: Number of cherry varieties planted by site – at the end of the project

	Primary Site	Secondary Sites		
	Wangaratta	Silvan	Adelaide Hills	Young
Cherries	61	22	51	21

In addition, cherry varieties are planted at some of the summerfruit sites. They are:

Renmark: 26
Swan Hill: 19

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While formal evaluations are not conducted on the cherry varieties planted at the summerfruit sites, they still provide a preliminary guide to the performance of the varieties in these very warm climates.

4.6 Evaluation methodology

Evaluations are conducted to a protocol (Attachment 1). The protocol is used for both Phase 1 and Phase 2 evaluations but with different recording sheets (or checklists). The protocol sets out the procedures for evaluation and defines some of the terms listed in the Evaluation Checklists.

Aim of the evaluation

The evaluation aims to identify varieties that will provide consumers with a good eating experience so that they will re-purchase. Overlaid on this is (i) time of season and (ii) cost of production – the variety must perform well agronomically and competitively (against other varieties) in the timeslot.

Evaluation Checklists

In general, the Evaluation Checklists describe the data to be recorded. The protocol provides additional information where the terms on the Checklist may need clarifying or may be able to be interpreted in more than one way.

The Phase 1 and Phase 2 evaluation Checklists, as used in the project, are provided at Attachment 2.

4.7 Evaluation Rigour and Interpretation of Evaluation Scores

Evaluation Rigour – training and calibrating evaluators

The project went to considerable effort to train regional evaluators so that

- each evaluator uses the same process to evaluate a variety; and
- each evaluator reports the results of the evaluation in the same way.

As regional Stage 2 evaluations started in 2012/13, in November 2012, evaluators were brought to the primary summerfruit site at Renmark for training and “calibration” – to ensure results are captured and reported the same way between regional sites. A similar training day was held in November 2013 at Graham’s Factree.

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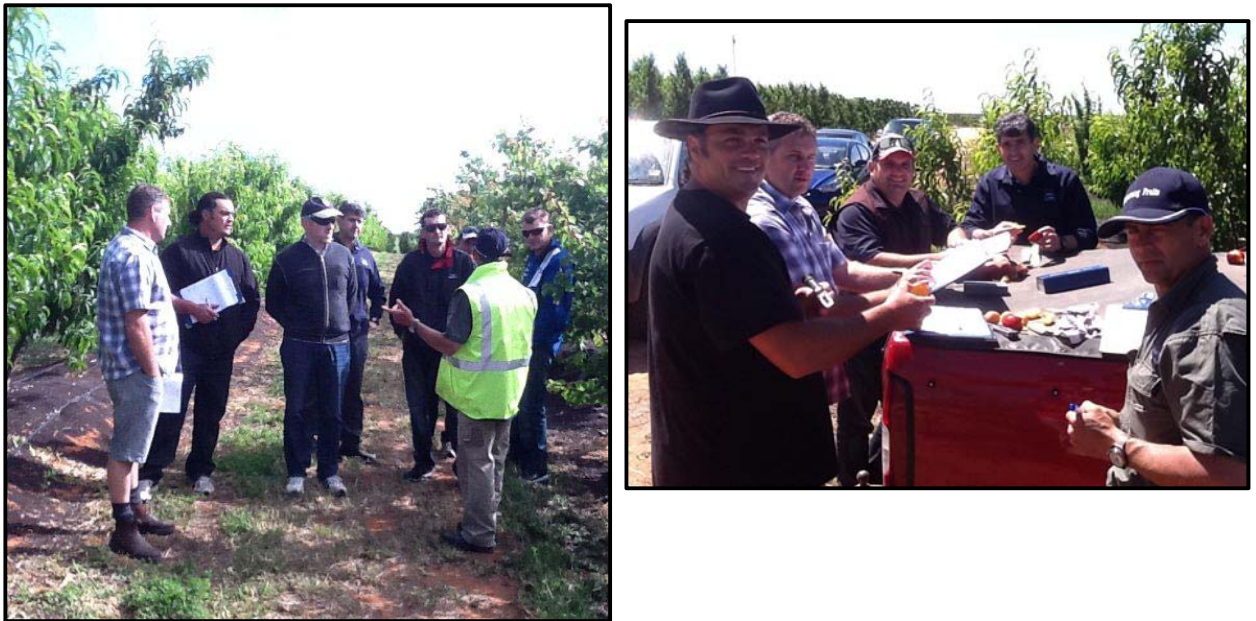


Figure 4: Evaluators training field day at the Summerfruit primary site near Renmark, November 2012

Stage 1, Stage 2 and interpretation of evaluation results

Varieties undergo Stage 1 and Stage 2 evaluations.

Stage 1 evaluations occur at the Primary Site and are of a "pass or fail" nature. Stage 1 evaluation aims to eliminate varieties that have serious flaws making them non-commercial. Varieties that pass Stage 1 are promoted to Stage 2 evaluation at the regional secondary sites. Stage 1 data is not provided in the Annual Report but can be viewed on the Graham's Factree website.

Stage 2 evaluations occurs at the regional sites (see above). Stage 2 evaluations are more detailed and provide information closer to that required by a grower for a commercial decision related to whether to plant the variety or not. In future years, the regional differences in performance will be particularly valuable to growers. All the data provided in the latter sections of the Annual Report relate to Stage 2 evaluations.

Scoring varieties and Interpreting scores

To allow varieties to be directly compared, they are given a score. As can be seen from the Evaluation Checklists, the overall score quoted for a Stage 2 evaluation is the average of the scores for skin/appearance characteristics, flesh characteristics, fruit characteristics and tree characteristics.

To provide growers with the ability to interpret the overall scores, the following 'definitions' are provided (for Stage 2 evaluations only)

Less than 5/10 = poor variety and should not be seriously considered.

5/10 = variety displays some negative attributes but needs further consideration.

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6/10 = variety is equal to the current commercial varieties available to growers and should be trialled by individual growers to validate that the variety accommodates their requirements.

6.5/10 = variety is showing that it is superior to current commercial varieties and should be seriously considered for commercial planting.

7/10 and above = variety is very good and is highly recommended for growers to consider planting commercially.

Regardless of the information provided by Factree, growers are encouraged to make their own decisions about planting a variety, taking into account:

- their orchard and its unique growing conditions
- the marketing program for which the fruit will be utilised

4.8 Evaluation results and their dissemination

Evaluation results, captured by the regional evaluators, are uploaded to the Factree database online. This means that the evaluator needs to handle the data only once (avoiding transcription errors) and that the data is immediately available to the Graham's Factree team.

Once in the Factree database, the evaluation results are made available to industry through three key pathways. They are:

Evaluation newsletters: These (approximately) weekly newsletters containing evaluation results are emailed to all growers on the Factree database. As Factree is a major supplier of summerfruit and cherry trees, this mailing list includes the vast majority of Australian growers.

During the project 55 newsletters were published as follows:

- 2010/11 7 newsletters
- 2011/12 12 newsletters
- 2012/13 20 newsletters
- 2013/14 16 newsletters

Annual Report: Each year the results of the Phase 2 evaluations undertaken in that year are collated into the project's Annual Report. This is a full colour booklet of (in 2012/13) 47 pages. The first 16 pages describe the project components: Pipeline Trips, Sites (including climate data), how the evaluation program works and the Evaluation Checklists used. The remaining 30 pages present the results of the evaluations – region, date of harvest, fruit description, evaluation results summary, overall score and maturity chart. This is done for yellow peaches, white peaches, yellow nectarines, white nectarines, apricots, plums and inter-specifics.

The Annual Report is a comprehensive and valuable document that is posted to all growers on the Factree database and remains available to all growers via the Factree website.

Factree Website. The Factree Website is a comprehensive resource providing access to all the evaluation data generated by the project. All the:

- evaluation reports for the four years of the project and from every region
- Weekly Newsletters for the project – over all years
- Annual Reports for the project

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are available from the website. The URLs for these are:

Evaluations: <http://evaluations.factree.com.au/Evaluations.aspx>.
Weekly Newsletters <http://evaluations.factree.com.au/ViewNewsletters.aspx>
Annual Reports: <http://evaluations.factree.com.au/Uploads/evaluation-report-2012-2013.pdf>

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5. Discussion

MT10051 is a substantial project spread literally across Australia. During the course of the project 983 individual varieties of summerfruit and cherries have been planted at the Primary and Secondary summerfruit and cherry sites. The vast majority of these are summerfruit. The secondary evaluation sites are now coming on stream. Secondary summerfruit sites, containing around 100 varieties have been planted at Shepparton, Swan Hill and in the Perth Hills. As well secondary evaluations are conducted on the trees planted in the summerfruit primary site located at Renmark. The varieties planted at the secondary sites were chosen by the local evaluators (with assistance from Factree) as varieties that, after primary evaluation, show commercial potential for that region. Cherries are not as far advanced with 61 varieties at the Primary Evaluation Site at Wangaratta, 21 at Young, 22 in the Dandenong Ranges and 51 in the Adelaide Hills. At the end of the project, the cherry sites had not yet started to produce significant volumes of fruit that could be taken as representative of the varieties.

There have been a total of seven hundred and seventy seven (777) Phase 1 evaluations and six hundred and two (602) Phase 2 evaluations completed under the four year term of this Project.

At the time of writing this report, there have been seven (7) new varieties commercialised in 2014, twelve (12) new varieties that are presently undergoing commercial scale testing (that is testing in commercial orchard plots involving 50 plus trees of the variety) and more than forty (40+) further new varieties being tested by commercial growers.

The distinguishing competencies of the project are as follows:

A wide range of material is being evaluated. The collective term "summerfruit" covers **six** crop types – white peaches, white nectarines, yellow peaches, yellow nectarines, plums and apricots. A summerfruit variety provides fruit for around 10 days. For a season stretching from early November to April (say 150 days) a grower needs of the order of 12-15 varieties for each crop type or around 80 varieties across the 6 crop types – more than this if interspecific apricots and plums are included.

This huge demand for varieties necessitates the large number of varieties the program is dealing with. It also denotes the importance of timeslots and how one variety fits alongside another. If the two ripen at the same time the grower may have more fruit than he/she can easily sell.

The results of the evaluations are made freely available to all growers. The results of the program are available via the Factree website to all growers. The Annual Report is posted to all growers on the Factree customer list free each year. As noted above, the project works hard to disseminate the evaluation data it collects.

A number of varieties have been planted at more than one secondary site. This will allow the impact of regional environments to be understood. The important differences will be in the timing of maturity and fruit quality between regions. This information will allow growers to select the best variety for their region for the timeslot they are considering.

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The project team is not aware of any other Australian program that publishes these “Genetics x Environment” interactions for summerfruit or cherries.

Overall, by planting a wide range of material in the four key production regions and making the results of the evaluation readily available to all growers, the project goes a long way to addressing one of the major risks a grower faces – that of planting the wrong variety for the timeslot in his/her region.

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6. Technology Transfer:

MT10051 has a considerable resource devoted to technology transfer (see Section 4.8 above). Factree has worked hard to:

Provide evaluation results in a simple and easy to use format. This is particularly the case for the Weekly Newsletters and the Final Report. The Overall Score (out of 10) quickly informs growers whether or not the variety is of interest. This is particularly valuable when the variety is evaluated in the grower's own region.

Widely disseminate evaluation results. Factree emails the Weekly Newsletter to all growers on its mailing list. This effectively covers all of the larger summerfruit growers in Australia. Similarly Factree posts the Annual Report for the project to all growers on its mailing list.

Providing the results in both "hard" and "soft" copy. Not all growers are comfortable working with websites, emails and the like. Some still prefer a hard copy on which they can make notes etc. By emailing the Weekly Newsletters and posting (by normal mail) the Annual Report, both groups of growers are covered.

Working with Summerfruit Australia Limited. Factree has also worked with SAL to publicise the project and its results. An example is the offer of free trial trees for commercial evaluations on grower's own properties. For this, Factree prepared a Press Release that was run by SAL in their e-Newsletter (see Attachment 3)

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7. Recommendations

7.1 Continue evaluation of summerfruit and cherries in Australia

Factree believes that MT10051 has been highly successful in helping growers manage the risk of planting varieties not suited to their region on their orchards.

However, this work is just getting started. Variety evaluation is a long term proposition. For summerfruit, first evaluations generally occur when the trees are in their third leaf. For cherries it is usually the fourth leaf. While nearly 850 varieties have been planted under MT10051, only those planted in 2010 are coming to the end of their evaluation period. This is of the order of 25% of the varieties planted during the project.

Further, varieties (in general) have to "pass" Primary Evaluation before they are sent to the secondary sites. Accordingly, there are relatively few varieties in these regional sites and (in general) their evaluations are just starting.

Given the above, the overwhelming recommendation arising from the project is that the evaluation work is continued for another 5 years. To this end Factree has provided HAL with another proposal (MT14004) which would take the evaluation work through to the end of 2018/19.

7.2 Mine the Interspecific evaluation data for new summerfruit products

A major task in the first year of the proposed new project will be to analyse the data from the evaluation of the 400+ interspecific varieties to look for "strings" of varieties that may allow new products for the summerfruit industry. These varieties complete evaluation at the Renmark Primary Site in the 2014/15 season. Evaluation of another large group of interspecific varieties was completed in 2013/14 – the last year of MT10051.

Variety strings can be thought of as varieties with similar fruit characteristics (e.g. skin colour, fruit shape, flavour) that fruit in timeslots adjacent to another variety with similar characteristics. Usually a string of 3-4 varieties, giving retail supply of at least 6 weeks, is required for a new commercial product.

Such strings of interspecific varieties will have attractive, consumer-wanted attributes such as unique skin colour, high levels of sweetness and unusual/different shapes. Marketed the right way they provide the basis of a new generation of summerfruit products for Australian growers.

It is important that these potential new products are identified and commercialised.

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8. Acknowledgements

Factree would like to acknowledge and thank the following people who have contributed significantly to the success of MT10051.

Jason Size: Jason has been the foundation on which the evaluation project has been based. He has helped Factree develop its systems, helped Factree train and calibrate its evaluators and during the term of MT10051, conducted literally thousands of evaluations. He has conducted both Stage 1 and Stage 2 evaluations and has reported them with rigour and commitment. He has commented on and helped develop various aspects of the project and always had a positive attitude towards it.

The evaluation team: The people who do the work. They include:

- Jason Size (Renmark – primary and secondary sites summerfruit)
- Jeff and Wayne Ghiladucci (Perth Hills – secondary site summerfruit)
- Rocky Varapodio and Michael Cisera (Shepparton – secondary site summerfruit)
- Jeff Sibley (Swan Hill – secondary site summerfruit)
- Tim Jones (Wangarrata – primary site cherries)
- Geoff Hall (Young)
- Steve Chapman (Silvan, Dandenong Ranges)
- Ian Sparnon (Adelaide Hills)

Factree wishes to thank and acknowledge each of these people for their support for and commitment to the evaluation work.

Our Industry Steering Committee who give two days a year to oversee the program – looking back over what has been done (and how we could do it better) and looking forward to continuously improving the operations of the program. In particular we wish to acknowledge and thank:

- Jim Sourtzis – summerfruit
- Steve Chapman - cherries
- Alok Kumar – HAL

Dr Alok Kumar, our HAL Program Manager (and Portfolio Manager) for his interest, participation and gentle direction of the project.

The Zaiger Family who are dedicated to the breeding of new and exciting stonefruit varieties and for their ongoing support of the Project and the Pipeline Trips by participants in the Project.

The Factree Team: Graham Fleming, Tony Willcocks, (previously) Lisa Corcoran, Russell Soderlund, Bec Fleming and Libby Fleming who have worked well together as a genuine team.

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ATTACHMENT 1: Phase 2 Evaluation Protocol

1. Purpose of this protocol

This protocol is to be used with the Graham's Factree Evaluation Sheets – both Stage 1 and Stage 2. It sets out the procedures for evaluation and defines some of the terms listed in the Evaluation Sheets.

2. Aim of the evaluation

The evaluation aims to identify varieties that provide consumers with a good eating experience so that they will re-purchase. Overlaid on this is (i) time of season and (ii) cost of production – the variety must perform well agronomically.

3. Evaluation sheets

In general the Evaluation Sheets describe the data to be recorded. This protocol provides additional information where the terms on the sheet may need clarifying or may be able to be interpreted in more than one way.

4. General Procedures

4.1 Data collected prior to harvest

Crop load:	Score tree before thinning and confirm at harvest. Flower density (on the sheet) is the same as crop load. Consider the commercial acceptance of a crop load despite the load being low or high.
Bloom date:	This is (i) the date of the pink bud stage and (ii) the date of full bloom. For Primary Evaluations record these two dates (pink bud and full bloom) not 10% bloom and full bloom as the Primary Evaluation Sheet (currently) says.
Doubles:	Observe at thinning and at harvest

4.2 Data collection at harvest – in the field

Time of day:	Evaluations will be done at the same time of day to allow (as much as possible for field evaluations) consistency in lighting, sun direction, temperature etc. Morning is preferred.
Maturity	Tree to be at the maturity at which the first, sizable commercial harvest would occur (i.e. not a colour pick)
Collection of Fruit:	Pick 12-15 pieces of fruit from all parts of the tree that can be reached from the ground – high and low. Size to be indicative of the variety – not the biggest, not the smallest. Some soft fruit must be included to be able to determine eating qualities. Place fruit in a bag (reusable shopping bags are good) or in trays in a carton. Keep each variety separate.
Identifying fruit:	It is important to name the fruit with the Factree variety code. This can be via a card or writing on the fruit with a marker pen.
Photographs:	Cut a longitudinal slice through the cheek to show the flesh. Hold in hand with two other pieces of fruit. Orient these to show the stem end and the blushed cheek. Always photograph in consistent conditions, normally in the shade. Fill the whole camera frame with the shot. Use the camera on its "macro" setting.

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Again, naming the fruit in the photo, is critical. A card can be used in the photo or some other system – but clear identification is essential.

4.3 Data collection in the laboratory/office/shed

Tree parameters:	These are normally recorded in the lab, from memory. If memory fails, the field plot needs to be revisited.
Select 10 fruit:	Eliminate the least uniform pieces of fruit – the large ones, smaller ones etc so that 10 remain.
Measure all 10 fruit:	This is done for fruit size and Brix. The average of the 10 readings is recorded on the sheet as is the range of the measurements taken.
Size measurement:	Measure at the "equator" of the fruit. Record the range of size readings as well as the average.
Colour General:	The comparison is against existing commercial varieties in the same time slot.
Colour type:	Avoid areas where there is obvious leaf shading.
Colour intensity:	A good way of assessing this is how the fruit stands out on the tree.
Background colour:	Look at the stem end for this. In general, green and yellow green result in a background that is less attractive to consumers.
Over colour:	This is the colour of the blushed area. Over colour is a "secondary" evaluation parameter compared to the type of colour (blush, stripe, soild etc)
Flesh Colour:	Look at the colour of the flesh away from areas where bleeding has occurred.
Fruit shape	for definition of shape, see Figure 1, below.
Fruit Indent:	This is at the non-stem end. An "indent" is the opposite of a "tip".
Recording flavour:	<p>For this the soft fruit selected in the sample are used. At least 5 fruit should be tasted. Normally the tasting is done on the slice of fruit cut for the Bx measurement.</p> <p>The comparison is of this variety vs other commercial varieties available in this time slot.</p> <p>Don't have coffee etc before tasting. For each variety, taste at least 5 fruit before scoring. Look for variation. Definitions:</p> <ul style="list-style-type: none">• Sub-acid: if eaten soft sub-acid fruit will often be bland• Low acid: if eaten soft low acid fruit will still have traces of bitterness (acid)
Measuring Bx:	Take a slice (2-3 mm thick) from the cheek (middle) on the most blushed side. If possible use a temperature compensating refractometer. If such an instrument is not available, be aware of temperature when the readings are taken and try to keep temperature as constant as possible between days. Record the range in the Bx readings as well as the average.

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Recording Texture: After taking the slice for the Bx measurement, bite the other (intact) side of the fruit and use this sample to determine texture. Sample at least 5 pieces of fruit before recording a score. More than one texture box can be ticked.

4.4 Overall Scores

Overall scores for Skin, Flesh, Fruit and Tree are the evaluator's mental integration of the parameters evaluated in each section

The final score out of 10 (bottom right hand corner of the Stage 2 sheet) is the average of the four previous scores. The final score can be interpreted as follows (for more detail see Evaluation Newsletter No 1 for 2013/14 season).

- less than 5/10:** poor variety and should not be seriously considered
- 5/10:** variety displays some negative attributes but needs further consideration
- 6/10:** variety is equal to the current commercial varieties available to growers for this timeslot and should be trialled on individual orchards
- 6.5/10** variety is showing that it is superior to current commercial varieties available to growers for this timeslot and should be seriously considered for commercial planting.
- 7/10 or greater** variety is very good and is highly recommended for growers to consider planting commercially.

Note that such scores must be from trees that are bearing enough fruit to allow this sort of definitive assessment – usually third leaf or older. Skin, Flesh, Fruit and Tree scores should reflect this overall score.

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ATTACHMENT 2: Phase 1 and Phase 2 Variety Evaluation Checklists

Stage 1 Evaluation					
Date of Evaluation	<input type="text"/>	Location	<input type="text"/>		
Evaluator Name	<input type="text"/>	Rootstock	<input type="text"/>		
Cultivar	<input type="text"/>	Variety	<input type="text"/>		
Split Stone	<input type="radio"/> Pass		<input type="radio"/> Fail		
Balanced Taste	<input type="radio"/> Pass		<input type="radio"/> Fail		
Russet	<input type="radio"/> Pass		<input type="radio"/> Fail		
Cracking	<input type="radio"/> Pass		<input type="radio"/> Fail		
Appearance	<input type="radio"/> Pass		<input type="radio"/> Fail		
Stem Tear	<input type="radio"/> Pass		<input type="radio"/> Fail		
Fruit Doubles	<input type="radio"/> Pass		<input type="radio"/> Fail		
Crop Yield	<input type="checkbox"/> High	<input type="checkbox"/> Medium	<input type="checkbox"/> Low		
Fruit Size mm	<input type="text"/>				
Bloom 10%	<input type="text"/>	Full Bloom	<input type="text"/>		
1st Pick	<input type="text"/>	2nd Pick	<input type="text"/>		
Skin	<input type="checkbox"/> Cream	<input type="checkbox"/> Green	<input type="checkbox"/> Orange	<input type="checkbox"/> Yellow	<input type="checkbox"/> Pink
	<input type="checkbox"/> Maroon	<input type="checkbox"/> Purple	<input type="checkbox"/> Red	<input type="checkbox"/> Dark Red	
Flesh	<input type="checkbox"/> Cream	<input type="checkbox"/> Green	<input type="checkbox"/> White	<input type="checkbox"/> Yellow	<input type="checkbox"/> Orange
	<input type="checkbox"/> Red	<input type="checkbox"/> Purple			
Flavour	<input type="checkbox"/> Acid	<input type="checkbox"/> Low Acid	<input type="checkbox"/> Sub-Acid		
Brix %	<input type="text"/>				
Score /10	<input type="text"/>				
Proceed to Stage 2	<input type="radio"/> Yes		<input type="radio"/> No		
Comments & Commercial Comparator	<input type="text"/>				

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Stage 2 Evaluation			
Date of Evaluation	<input type="text"/>	Location	<input type="text"/>
Evaluator Name	<input type="text"/>	Rootstock	<input type="text"/>
Cultivar	<input type="text"/>	Variety	<input type="text"/>
Pink Bud	<input type="text"/>	Full Bloom	<input type="text"/>
1st Pick	<input type="text"/>	2nd Pick	<input type="text"/>
Skin Thickness	<input type="checkbox"/> Thin <input type="checkbox"/> Medium <input type="checkbox"/> Thick	Colour Intensity	<input type="checkbox"/> Dull <input type="checkbox"/> Moderate <input type="checkbox"/> Bright
Colour Type	<input type="checkbox"/> Striped <input type="checkbox"/> Solid <input type="checkbox"/> Blushed <input type="checkbox"/> Bi-coloured		
Over Colour	<input type="checkbox"/> None <input type="checkbox"/> Cream <input type="checkbox"/> Green <input type="checkbox"/> Orange <input type="checkbox"/> Yellow <input type="checkbox"/> Pink		
%	<input type="text"/>	<input type="checkbox"/> Maroon <input type="checkbox"/> Purple <input type="checkbox"/> Red <input type="checkbox"/> Dark Red	
Background Colour	<input type="checkbox"/> Cream <input type="checkbox"/> Green <input type="checkbox"/> Yellow/Green <input type="checkbox"/> Yellow		
Bruising	<input type="checkbox"/> Absent <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy		Skin /10 <input type="text"/>
Flesh Colour	<input type="checkbox"/> Cream <input type="checkbox"/> Green <input type="checkbox"/> White <input type="checkbox"/> Yellow <input type="checkbox"/> Orange <input type="checkbox"/> Red <input type="checkbox"/> Purple		
Flesh Texture	<input type="checkbox"/> Hard <input type="checkbox"/> Coarse <input type="checkbox"/> Crisp <input type="checkbox"/> Crunchy <input type="checkbox"/> Rubbery <input type="checkbox"/> Soft		
	<input type="checkbox"/> Juicy <input type="checkbox"/> Grainy/gritty <input type="checkbox"/> Medium <input type="checkbox"/> Fine/melting		
Bleeding	<input type="checkbox"/> None <input type="checkbox"/> Around stone <input type="checkbox"/> Under skin		Amount <input type="text"/> Flesh /10 <input type="text"/>
Ave Fruit Size mm	<input type="text"/>	Brix %	<input type="text"/>
Fruit Shape	<input type="checkbox"/> Oblong <input type="checkbox"/> Ovate <input type="checkbox"/> Rounded <input type="checkbox"/> Slightly flat <input type="checkbox"/> Asymmetric <input type="checkbox"/> Symmetric		
Fruit Tip	<input type="checkbox"/> Large <input type="checkbox"/> Flat <input type="checkbox"/> Slight		Fruit Indent <input type="checkbox"/> Deep <input type="checkbox"/> Flat <input type="checkbox"/> Slight
Flavour	<input type="checkbox"/> Acid <input type="checkbox"/> Aromatic <input type="checkbox"/> Balanced <input type="checkbox"/> Bitter <input type="checkbox"/> Bland <input type="checkbox"/> Slightly sweet		
	<input type="checkbox"/> Very sweet		Firmness <input type="checkbox"/> Soft <input type="checkbox"/> Medium <input type="checkbox"/> Hard
Split Stone %	<input type="text"/>	Fruit /10	<input type="text"/>
Russet	<input type="checkbox"/> None <input type="checkbox"/> Some <input type="checkbox"/> Majority		
Russet Position	<input type="checkbox"/> Calyx end <input type="checkbox"/> Cheeks <input type="checkbox"/> Complete <input type="checkbox"/> General <input type="checkbox"/> Lenticel <input type="checkbox"/> Stem bowl <input type="checkbox"/> Stem end		
Sunburn	<input type="checkbox"/> Absent <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy		
Stem Tear	<input type="checkbox"/> None <input type="checkbox"/> Some <input type="checkbox"/> Severe		Stone Type: <input type="checkbox"/> Cling <input type="checkbox"/> Semi-Cling <input type="checkbox"/> Free
Limb Rub	<input type="checkbox"/> None <input type="checkbox"/> Light <input type="checkbox"/> Moderate <input type="checkbox"/> Heavy		
Cracking	<input type="checkbox"/> None <input type="checkbox"/> Some <input type="checkbox"/> Severe		Preharvest Drop <input type="checkbox"/> Evident <input type="checkbox"/> Not Evident
Fruiting Habit	<input type="checkbox"/> Lateral bearer <input type="checkbox"/> Semispur <input type="checkbox"/> Spur Type		Uniform Ripening <input type="checkbox"/> Yes <input type="checkbox"/> No
Flower Density	<input type="checkbox"/> None <input type="checkbox"/> Light <input type="checkbox"/> Average <input type="checkbox"/> Heavy <input type="checkbox"/> Commercial		
Fruit Doubles	<input type="checkbox"/> None <input type="checkbox"/> Low <input type="checkbox"/> Average <input type="checkbox"/> High		
Crop Load	<input type="checkbox"/> None <input type="checkbox"/> Light <input type="checkbox"/> Average <input type="checkbox"/> Heavy <input type="checkbox"/> Commercial		
Tree Vigour	<input type="checkbox"/> Weak <input type="checkbox"/> Average <input type="checkbox"/> Strong		Tree Habit <input type="checkbox"/> Upright <input type="checkbox"/> Upright spreading <input type="checkbox"/> Spreading
Bacterial Spot	<input type="checkbox"/> None <input type="checkbox"/> Few <input type="checkbox"/> Many <input type="checkbox"/> Smothered		Tree /10 <input type="text"/>
Comments & Commercial Comparator	<input type="text"/>		Overall Score /10 <input type="text"/>

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ATTACHMENT 3: Variety Commercialisation Press Release (SAL e-newsletter)



PRESS RELEASE

20th January 2014

Evaluation Project reaches Commercialisation Phase

For the last three years, Graham's Factree has been operating the stone fruit variety evaluation R&D project known as "MT10051: Making good variety investment decisions. A tree fruit variety evaluation program for Australia". The project is now providing a much needed stream of comprehensive evaluation information for the Australian industry. This data is available to all growers and packers at the Graham's Factree website at <http://evaluations.factree.com.au/> The evaluation program's Annual Reports can also be downloaded from this website.

The project has been successful in identifying new peach, nectarine, cherry, plum and interspecific varieties that could improve commercial returns at particular times during the season. These varieties are rated at a score of 6.0 or higher in the evaluation reports (and Annual Report). This score is interpreted as indicating that the new variety has been evaluated as being equal to, or in some cases better than, current commercial varieties for the same timeslot.

Graham's Factree is now looking to encourage growers who may like to receive test trees (2 trees per variety) to try any of these higher scoring new varieties on their own orchards, to contact the nursery. The only obligations associated with receiving the test trees are to sign a standard cultivar testing agreement and to provide feedback to Graham's Factree about the performance of the variety on your orchard.

Growers considering testing the new varieties from the evaluation project should call Graham Fleming at Graham's Factree on (03) 9999 1999.

The MT10051 research project is funded by Graham's Factree and the Australian Government through Horticulture Australia Limited.