

Evaluation of new pear rootstocks

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Australian Pome Fruit Improvement
Program Ltd.

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Final Report

HAL Project – AP04001

Evaluation of New Pear rootstocks

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Australian Pome Fruit
Improvement Program Ltd

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Apple & Pear Australia



Know-how for Horticulture™

HAL Project – AP04001

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** Following the completion of an agency agreement on the 31st of July 2008 between Apple & Pear Australia Limited (APAL) and the Australian Pome Fruit Improvement Program Limited (APFIP) all APFIP operations are managed now by APAL. Garry Langford as Manager of Manger Projects for Coregeo™ Australia a division of APAL has responsibility for the operations of APFIP.*

This reports sets out progress to date for the trialing of new pear rootstocks for their precocity and adaptability to Australian growing conditions.

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1. Media Summary

The Australian pear industry has developed in the main around processing and is based in the Goulburn Valley of Victoria. The processing industry is now requiring considerably less volume than 10 years ago (69,400 tonnes in 1997 to less than 40,000 tonnes in 2009), total pear production has also fallen from 173,600 to 134,700 tonnes over the same period. The reliance on processing by growers has resulted in little or no industry innovation and development particularly in the area of new rootstocks.

The average age of trees in the pear industry is an issue (more than 50 years) which is having an impact on production volumes and fruit quality. Almost 100% of trees in the Goulburn Valley are planted on seedling rootstocks. Newer more intensive plantings are not well suited to the use of seedling as a rootstock as it's too vigorous and for most varieties is not precocious enough.

The aim of the project is to identify pear rootstocks that are adapted to the Goulburn Valley in the first instance and that are precocious. Production from new orchard plantings should be in the vicinity of 150 tonnes cumulative yield per hectare at the end of the first 5 years after planting.

Rootstock trials take at least 10 years to show reliable results. The current trial is just 5 years old and ongoing assessment is required. Initial observations have shown that yield performance of the rootstocks can vary greatly depending on the variety used. Early indications are that BM2000 is well suited for the Williams and Packham varieties, the seedling rootstock D6 has performed best with Corella. These observations are based on measurement of crop load against trunk cross sectional diameter and cumulative yield. The Corella/D6 result is somewhat of an aberration as 30% of trees in the trial on this combination died in the first year and the balance lack thrift. Based on this result it would not be recommended to plant this rootstock/variety combination.

An identified shortage of consulting expertise with regard to pear production was also addressed in this project. Three [3] visits were arranged for a leading European pear expert to visit pear growing regions in Australia. Future success for the Australian pear industry is based on growers being able to maximize returns from their existing orchards. The consultant visits focused on existing plantings as well as new plantings with visit to the Perth Hill and Donybrook in W.A. Lenswood in S.A, and the Goulburn and Yarra Valleys in Victoria.

These visits have assisted in Australian growers gaining an understanding and appreciation of the value that expert consultants can bring to their businesses particularly in the area of intensive pear production.

2. Technical Summary

The aim of the project is to identify pear rootstocks that are precocious and adapted to Australian growing conditions. The Australian industry is built on the use of seedling rootstocks and these are not well suited to the intensive plantings systems that are required to ensure the Australian industry is competitive.

Experience from the apple industry has shown that it's quite difficult to get growers to take the first step into more dwarfing rootstocks. The industry adopted the MM106 rootstock which is around 60% the size of seedling as its rootstock of choice in developing new intensive orchards. Once an understanding of this rootstock was gained the industry then progressed to the more dwarfing rootstocks M26 (40% the size of seedling) and M9 (25% the size of seedling).

With this knowledge pear rootstocks that were available in Australia in the region of 60% the size of seedling were selected for the trial. The site has been designed to include 6 rootstocks inclusive of calleryana D6 as the control. There are 3 commercial varieties, Packhams Triumph, Williams and Corella grown on a centre leader and open Tatura system. There are 50 trees of each variety on each rootstock in each growing system. The rootstocks planted in the trial are Quince A (with Burre Hardy interstem planted in 2005), BP1 and BM2000, Pyro Dwarf has yet to be planted and DCA Fox11 was planted into the site in 2009. This delay is due to delays in bulking up the rootstocks following post entry quarantine.

The lack of high quality technical advice for intensive pear production was also seen as a limiting factor for the uptake of rootstocks. To assist in this area the project included three visits from Jef De Coster a world renowned pear production expert. These visits were timed to coincide with pruning, harvest and post harvest and included Donnybrook and the Perth Hills in W.A., Lenswood in S.A and the Yarra and Goulburn Valleys in Victoria.

The Goulburn Valley has experienced 3 of its driest years on record during the course of the trial. Access to and purchase of water was a significant issue for the trial. Water was applied at the normal rate for a planting on D6 seedling. This resulted in lower yields in 2008 particularly from the BM2000 rootstock where fruit size was affected.

Early indications are that the BM2000 rootstock is well suited to the Goulburn Valley. It is quite precocious and tree size is approximately 25% less than D6. BP1 also compares favourably on tree size with BM2000 but is not showing the same levels of precocity. The trial needs at least another five years of assessment before clear results are likely to emerge.

The visits by Jef De Coster have assisted in creating the environment in which growers are prepared to pay for technical advice which is a significant step forward.

3. Introduction

The Australian pear industry has 87% of its production in the Goulburn Valley. For a considerable period in its history processing has been a keen focus of Australian pear producers with the Williams variety being grown almost exclusively for this purpose. Large trees with quite high production were the industry standard when labour and input costs accounted for a much lower percentage of the production costs than they do today. The industry has in effect been asleep at the wheel as if mesmerized by processing. This situation is not unique to Australia as the focus on processing has impacted on the industries in the USA and Argentina by way of slow adoption of new orchard production systems. This situation has not been helped by the lack of new and exciting pear varieties around the world.

The pear industry in Belgium and Holland has expanded exponentially over the past decade. The focus has been on new and developing markets particularly in Russia. Access to dwarfing rootstocks and high quality fresh market varieties has been the catalyst for this expansion.

Trial Aim

The aim of the project is to assess the local adaptability/suitability of the selected rootstocks with a view that they need to be precocious and have the ability to produce a crop in year 2 and sustain an annual increase in production and be in full bearing by year 5. The fruit quality produced needs to be equal to, or better than current outcomes on D6.

Management of the site

The aim is to manage the site with pruning and training based on existing local practices. Irrigation scheduling will be the same for all the rootstock variety combinations. There will be no manipulation of trees to reduce or control growth

Data Collection

Performance data will be collected that includes yield as a measure of trunk cross sectional area and shoot growth for each rootstock/variety combination. The timing of the first crop and cumulative yield over the life of the site. Fruit quality parameters, pressures, %TSS, skin defects etc.

Information dissemination

APFIP will supply production and management advice through a pear consultant and there are 3 planned visits to Australia by a European pear consultant as part of the project. These visits are proposed to extend beyond the demonstration site to orchards in the Goulburn Valley. There will be at least an annual field day at the site. The demonstration site data will be published in industry journals and publications and be available on the APFIP website.

The potential impact of this project on the development of the Australian pear industry is significant. Australian apple growers have diversified into to other fresh fruit crops over the past 5 to 10 years, particularly cherries. If pear rootstocks can be indentified that

provide the dwarfing characteristics and precocity that apple growers have grown use to then apple growers will see pears as a diversification opportunity. This will put pressure on traditional pear growers to modernize at a faster rate. This can only be good for the future of the pear industry.

4. Materials & Methods

Growing trials have traditionally been a very effective method of getting information and technology improvements to the Australian pome fruit industry. The use of rootstocks other than seedlings has been quite limited in Australia. The dissemination of research results from overseas trials has always been treated with some skepticism and has usually resulted in quite slow uptake by growers. The ability and/or availability of suitable Australian research stations to conduct trials has been steadily reducing over the past 15 to the point where this option is almost non-existent. Growers also have a tendency to dismiss trials on research stations as not providing a “commercial outcome” that they can relate to. Notwithstanding this research and development is still a vital ingredient of any vibrant industry. R&D activities should focus on the things that growers cannot afford to take a risk on. The effective use of rootstocks is an area of risk that Australian growers have not taken up.

Taking all this into account the obvious way forward was for a physical trial of new rootstocks in a commercial orchard using varieties and growing systems that growers were familiar with in an area that was representative of a significant production area.

5. Results

The cumulative data from the site has been provided previously as part of milestone reports.

Early indications are that the performance of the rootstocks is somewhat variety specific. Williams pear performs best on BM2000, Packhams on BP1 performs similarly with BM2000. The yield figures for Corella on D6 are interesting in that it’s clearly the best performer but the rate of tree death with this combination in the trial would make it not a commercial option.

There have been no measurable differences in fruit quality between the rootstock variety combinations.

Yield differences between the growing systems are as expected. That is the open tatura trellis is achieving higher earlier production than the centre leader system but this is related to tree numbers per hectare.

The past three [3] years have been exceptionally dry in the Goulburn Valley with water being a key requirement. The rootstocks in the trial have shown that they are adapted to the conditions as no adverse effects have been observed. Although fruit size on the BM200 rootstock was down in 2008 as a result of higher crop this was attributed to

irrigation as the trial is setup to be irrigated to the requirements of the control which is the D6 rootstock. On current indications all the rootstocks in the trial are showing a high level of adaptability to local growing conditions.

Frost events at flowering and fruit set in 2006 & 2007 resulted in severely reduced crops in these years. This has had a significant impact on the cumulative yield for all of the variety rootstock combinations in the trial. Improved alarms systems have been implemented to mitigate against this occurring in future years.

The rootstocks Pyro Dwarf and DCA Fox 11 were included in the trial plan based on information received from the Australian importer. Issues related to effective and successful propagation of the rootstocks following post entry quarantine have resulted in their delayed inclusion in the trial.

The trial needs at least 5 years more data before reliable results can be considered. The trial is on track to achieve its aims as described earlier in this report.

6. Discussion

A Winter Pear School was conducted by DPI Victoria at Tatura in June 2009. The school was conducted over 3 days with 40 growers per day attending the two days of presentations. The evaluation responses for the school ranked rootstocks second in importance to improving productivity techniques. There is clearly a change in grower thinking in respect of rootstocks. The Goulburn Valley is littered with many poorly performing orchards that have been planted intensively on D6 rootstocks. Where they have performed well it's been because of significant manipulation inputs from growers.

For the pear industry to progress it needs access to precocious rootstocks that are adapted to Australian conditions. It's proposed that a further five [5] year project proposal be prepared for the rootstock trial. It's not proposed that this proposal will include any further visits from pear production experts. Field days at the rootstock trial would become the practical focus of the next project along with regular reporting of the trial results. The concept of a Winter Pear School being held every 2 years would become the forum for inviting pear experts to present and engage with the Australian industry.

7. Technology Transfer

Results from the trial have been published annually via the APFIP website and through the Australian Fruit Grower Magazine. An annual field day has been conducted at the site in each of the years. The field days have been conducted around the visits of Jef De Coster. The trial site and the data from it were used as a focus for the Winter Pear School that was conducted at Tatura in June 2009. This event was attended by over 80 growers in total. The site has had numerous visits from local growers who have arranged visits directly with the grower whose property the site is on.

8. Recommendations

Early indications are that rootstocks other than D6 are suited to pear production in the Goulburn Valley. Delays in accessing quince A, DCA Fox 11 and Pyro Dwarf rootstocks has meant that meaningful results have yet to be collected on these. It's highly recommended that ongoing support is provided to this project for at least another 5 years but more likely 10 years. The proposed project proposal from 2009-14 would not include a visiting expert component and simply focus on data collection from the trial. This would significantly reduce the cost of the project.

It's recommended that the visiting expert initiative be maintained through the presentations at a winter pear school that's held every 2 years. The next school would be programmed for 2011 and a separate project proposal would be submitted to support this.

9. Acknowledgments

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10. Bibliography

Nil.