Australian Government
Rural Industries Research and Development Corporation

Pomegranate

Investment background

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RIRDC Shaping the future

Australian Government
Rural Industries Research and Development Corporation

Pomegranate

Preliminary assessment of the potential for an Australian industry

by Colin Lye

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Pomegranate – Preliminary assessment of the potential for an Australian industry

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Foreword

This study was conducted to provide a preliminary assessment of the pomegranate industry in Australia and internationally, and provide recommendations to RIRDC for further investment. The investigation follows from recent data uncovered from the USA which shows the pomegranate juice market has expanded between 2001 to 2005 by greater than 750%, into a $66 million retail industry (AC Nielson). This report looks at the potential of not only the juice market, but also, fresh product and arils (fleshy seed cover containing juice). The intention of the report was to provide a quick 'snap-shot' of the industry for future investment decisions and is based around a series of questions supplied by RIRDC to the author.

The study has uncovered a wide range of pomegranate varieties currently being sold by nurseries in Australia. Establishing a central germplasm collection and 'typing' these varieties is important in developing a new industry, as this will provide the new market with a degree of certainty on what it is they are purchasing. The study also shows the opportunity for a southern hemisphere producer, such as Australia, to market a counter-seasonal product into the northern hemisphere. In Australia there is currently estimated to be only 200ha planted, even so, there is a high degree of interest from prospective investors and a belief that this area of planted pomegranates will expand rapidly over the coming years. This report is the first step in trying to identify 'gaps' and where they exist.

The Rural Industries Research and Development Corporation invests in new and emerging industries on behalf of government and industry stakeholders. New industries provide opportunities to be captured by rural producers and investors. They also provide avenues for farmers facing adjustment pressure to diversify and manage change. The establishment of new industries contributes to community resilience and regional development. Increasingly, new industries are also contributing to a distinctive regional character in rural Australia.

New industries face a number of challenges – developing product quality and quantity, developing markets and supply chains, and industry leadership. Many of these issues are underpinned by research and development. Often, too, they are hampered by a lack of basic statistical information, which is why RIRDC has invested in this report.

The importance of this report is that it will be a useful basis for those contemplating investment or formulating policy and will help to inform RIRDC as it plans its research and development priorities into the future.

This project was funded from RIRDC Core Funds which are provided by the Australian Government.

This report, an addition to RIRDC's diverse range of over 1800 research publications, forms part of our New Plants Product R&D program, which aims to facilitate the development of new industries based on plants or plant products that have commercial potential for Australia.

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Peter O'Brien
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- California Pomegranate Council, USA
- Hartley Lewis - Lewis Horticulture, SA
- Robert Gray - One Harvest, QLD
- Various Producers around Australia who are playing with the species.

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Executive Summary

What the report is about
This study was conducted to uncover the extent of pomegranate production in Australia and provide recommendations to RIRDC for further investment. The report looks at the potential of not only the juice market, but also, fresh product and arils (fleshy seed cover containing juice). The intention of the report was to provide a quick 'snap-shot' of the industry for future investment decisions and is based around a series of questions supplied by RIRDC to the author.

Who is the report targeted at?
The report is initially targeted for use by RIRDC in assessing future investment of Federal Government funds into this developing industry; however, it will have benefits for any new entrant with an interest in pomegranates.

Background
The Pomegranate (*Punicum Granatum*) is mentioned in history as far back as in the writings of Old Testament. Very little is really known about the fruit other than it has very high levels of antioxidants. Its history in Australia has been primarily as a back yard ornamental. The original source of plant material is suspected to have come from somewhere between Iran to the Himalayas in northern India. Global production is mainly centred in the Mediterranean and Middle Eastern regions. Pomegranates are grown also in similar climates in the USA, South America and Australia. Because of a history of anecdotal health benefits, a lot of research is currently being undertaken to better understand the nutritional benefits. Little is being done currently on the production or breeding side for industry development. True potential yields are unknown, but what we do know is the average fruit is approximately 50% by weight seed, or Arils as they are known, and 25% juice.

Aims/Objectives
The study aims to provide current and new growers, processors, packers, consolidators, transporters, wholesalers and nurseries with a 'snap-shot' of the Australian pomegranate industry and its potential.

Methods used
Very little is published on the production of pomegranates, so the method relied on was 'one-on-one' discussions with primarily growers currently evaluating the commercial value. Literature searched uncovered documentation of the tree costs of production, returns per ML water and yields that was quite variable and at best unreliable.

Results/Key findings
Worldwide there is a significant amount of research currently being undertaken into the health benefits of pomegranates. These studies indicate that pomegranates have an efficacy against a range of diseases including cancers. There is potentially a counter seasonal opportunity for exporters sending fresh produce (whole fruit or arils) into the Northern Hemisphere. Globally the market is expanding and it is anticipated that Australia will follow this trend.

Recommendations
- Further investigation into the technology required in the value adding area for juice concentrate and aril extraction
- Market research into the positioning of the products in the Australian context
- Development of an assurance system for varieties to be true to type. This could be done through the establishment of a genetic resource centre that includes all current plant material available
- Production research – best practices for the different end-market (juice, fresh, arils etc)
- Propagation research – use of rootstocks and breeding new varieties
- Post-harvest research – storage and increase shelf life

- Develop a research provider to become the ‘knowledge hub’ for the new industry. Collating information and networking with overseas institutions should be encouraged.

Introduction

Background

Very little is published on the production of Pomegranates so a reliance for facts was heavily on discussions with primarily growers currently evaluating the commercial value of this product. Documentation of the tree costs of production, returns per water (ML), and yields, is quite variable and at best unreliable. The true market size and real return is unknown, other than to say that it could be quite significant considering the way the market has grown and is continuing to grow around the world. Australia has an opportunity to participate in this as currently nearly all the product is being grown in the Northern Hemisphere. Being a seasonal fruit, despite it ability to be stored, there is a counter seasonal opportunity for exporters.

Pomegranates have many varied uses. The primary uses are:

- Fresh Juice
- Fresh Fruit
- Concentrated Juice
- Arils
- Products such as tea's
- Pharmaceutical and medicinal uses
- Dyes and decoration.

Currently there exist in Australia various stakeholders who are already investing capital either into plant material or developing a market for the expected product. Current market size from locally produced product is almost insignificant, with this production being marketed usually in April each calendar year. In the last 4-5 years California has shipped 10-14 40ft containers each year to Australia, with a market value of around $500K. Prices are quite high at the retail level ($2.50 - $3.50/fruit), so it is hard to gauge just yet what a more realistic price return is for the various forms of usage. As the fruit becomes more consistently available, this will change.

POM Wonderful™, the major Californian producer and marketer, has a web site (www.pomwonderful.com) that gives a fascinating insight into the history of Pomegranates. There is a lot of historical evidence collected suggesting it was one of the first 5 crops along with figs, dates, olives and grapes to be cultivated. Domestic production starting 3-4000BC in North Iran and Turkey. It is a symbol of fertility and is talked about in Aesop's Fable's and mentioned in Shakespeare's work Romeo and Juliet. Tom Roberts, the Australian artist from the last century, has even painted a scene depicting pomegranates. In French it literally means seeded apple. *Punicum*, acknowledges its Carthaginian heritage and *granatum*, refers to its numerous seeds.

The following link best describes the health attributes of Pomegranates www.pomwonderful.com/cancer. POM Wonderful™ have invested large amounts of money in better understanding and quantifying the health benefits of consuming pomegranate juice. This has fuelled some of the demand. The parent organization is the largest commercial producer of fruit with over 5000ha planted on the west side of the San Joaquin Valley in California. Large sums of capital have also been put into developing a processing facility based in California for both concentrate and aril extraction.

Around the world, the cultivars having the biggest impact are:

- Wonderful, Early Wonderful, and Granada in the USA with the later 2 being quite possibly what is being used in commercial production here in Australia
- Moller & Valencianas in Spain
- Ahmar, Aswad and Halwa in Iran
- In India it is Bhagawa, Ganesh, Mrudula, Kabul, Alandi and Ruby Red
- Wonderful and Red Loufani in Israel
- Mangulati in Saudi Arabia
- Hicaznar a sweet / sour cultivar from Turkey
- Italy – Sicily is Dente Di cavallo.

In recent times most of the above have been imported into Australia privately, along with many others and can be bought from some of the nurseries quoted in the acknowledgement. There are many hundreds more selections, strains & sports. Breeding programs are scarce with some work being done in India, Turkey, Spain and Israel. We have discovered that the same cultivar can often have a different name in another country or language. Some cultivars will require a royalty payment when purchased. Payment of production royalties or grower clubs, do not appear to be developing in Australia.

Flavour can range from tart to sweet depending on culture, external colour from a yellowy red to bright red and the arils from a light pink to a crimson red. Some varieties will have a high percentage of hard seed which reduces their market potential. Fruit size and yield is unknown for most. Rind thickness is also a consideration as this trait is directly related to aril and juice content and may have some advantages and disadvantages in unseasonable weather.

It is both a self pollinating plant and can also be cross pollinated by insects. It flowers quite indeterminately, resulting in multiple pickings. Its growth habit is scrub like, needs propping up to support large crop loads, can and will sucker from the base, be quite spiny at times and has glossy green, narrow leaves. The flowers are usually a bright attractive red. At fruit set, the immature fruit can range in colour which causes problems at picking time as it is very difficult to tell if the fruit is mature.

Propagation occurs via hardwood cuttings as the genetic variation in the seedlings is quite large. They graft quite readily. Most orchards are planted in low number configurations ranging from 300 to 800 trees per ha. They often are trained to keep the main stem clean at the base. Some fruit is seen in year 2 but realistically from year 3. The trees are considered mature at about year 7. Fruit is picked 6-7 months after flowering when soluble solids reach 15-17% depending on cultivar.

Fruit must be clipped off rather than torn. Yields range between 10-25T / ha. Fruit can be stored up to 3 months using controlled atmosphere and other technology. More needs to be understood about fruit size for the market place hence the variety planted. Arils extracted by hand require the fruit to be broken open in water and the arils can be drained from the bottom using a sieve or something similar. This also stops staining of your clothes as you attempt to do this.

Commercial Possibilities

Internationally the market for Pomegranates is evolving as it establishes itself amongst the competition from other fruits. New products and players are evolving all the time. Existing products such as the POM Wonderful Juice™ are selling at high price points with demand out-stripping supply. It has been part of a number of countries' diet and culture for many thousands of years. As these people have moved around the world we have seen pomegranates travel with them and they can more often than not be found growing in the suburban back yards for home use. Growth in the market place is appearing as value added products which are expanding the demand. The health benefits are being researched and have helped the category refocus, along with fancy and very clever marketing.

Structure and Location

Globally, it is estimated, total production amounts to around 2,000,000 M Tonnes, of which India would produce 50% of in the states of Maharashtra and Andra Pradesh. The majority is eaten locally with an increasing trend to export to Europe and the Middle East. Iran seems to be the second largest producer with estimated 55,000 ha's in production and another 6,500 ha's still to bear. It is believed these acreages are producing around 700,000 tons. Spain produces about 50K Tonne used both locally and through Europe. The United States has in total about 6000ha and is projected to increase to 10,000ha over the next 3-4 years. The balance is produced in countries such as Turkey producing around 80,000 tons in 2003 and other Mediterranean countries which include Morocco, Italy as well as the Middle East and former Russian states.

Dominant player is POM Wonderful™ in the USA.

Current Production Trends

Production is rising more so in California of sweet varieties only. All other Northern Hemisphere countries seem to be stable except possibly Turkey and Iran. South Africa has seen a number of trial plantings occur in the recent couple of years which we believe do not account for any more than 100ha. Chile and Peru have started planting Wonderful in an attempt to capture some counter seasonal market share into the USA. Market places such as Germany, where there is over 4M Turkish emigrants, would indicate solid market potential. Australia is estimated to have 200ha planted, with the largest single planting in Condobolin NSW.

The Supply Chain

The supply chain is not well organised. The number of growers producing is quite high and often in very small areas so putting consistent lines of fruit together with QA accreditation is difficult.

The UK consumer market is organised with pre arranged supply chains in place with Category Managers to the majors doing the work. Aril processing for this market is happening in South Africa, Spain, the Netherlands and Israel depending on the timing of supply. The USA, as mentioned is dominated by POM Wonderful™ in all categories and also Simonian Fruit and Californian based, more so in fresh fruit. Seven new faces have emerged in the juice sector in the USA. These include Fruitfast, Traverse Bay Farms, Odwalla, Pomegreat Juice, Purely Juice, R.W. Knudsen and Old Orchard. Arils are being packaged under a number of private labels include Trader Joes who do juice themselves as well.

In Europe most of juice / cordial suppliers are Turkish based with Fresh – 4U and IC-Tahal Agricultural Enterprises being the larger ones. Arils are being used as an ingredient in the pre packaged and prepared meals segment as you would see in Marks & Spence UK.

Main Issues being faced in the Overseas Markets

Cultivars are still being identified to suit particular categories and relate these back to a farm gate / return per ML water. True market size is still not understood or known as no consolidation is occurring while it is in a rapid growth phase. Currently demand is out-stripping supply. One manufacturer has lifted prices to stem this issue with little real effect in the UK market. The aril market has been a relatively new opportunity due to the technology not being available to extract the arils from the fruit without involving a large component of labour. The high cost of installing the machines is still a barrier for some. Suggested possible costs for one aril extraction unit alone before infrastructure is around $500,000(AUS).

Market size and production

Current production is around 2M tonnes. The yields being achieved are variable as most production is not fully irrigated. To understand full genetic production potential, a better understanding is required of how much is being produced in third world countries. 30T per ha is most likely achievable but ultimate farmgate return will be dependent on quality. Consumer research work needs to be undertaken to determine what size and gross dollars are being achieved in each market segment globally. Juice and concentrate products are being processed differently depending upon publicly available technology. Some technology is developed in house and is not accessible.

Export Potential for Australian Producers

For the fresh market, export potential is large due to our counter-seasonal ability to supply a market that is already consuming 2M tonnes. Market access to places like South Korea, USA and Japan may need applications made with or through Horticulture Australia's market trade access program.

The Horticultural Market Access Committee (HMAC) which is the peak horticulture industry / government agency committee for market access has received an application for market access of Australian pomegranates to the USA which the committee has approved. The next step is for Biosecurity Australia to progress quarantine access negotiations with the US authorities consistent with the priorities into that market, as also established by HMAC. The detail of quarantine access applications are held in commercial confidence unless the applicant confirms otherwise. Applicants are submitted for national access rather than access for an individual applicant. This should be further expanded to other markets where we have traditionally had access denied.

Our closest Asian neighbours may need some educating to see it being accepted. The Middle East and Europe where market access is not such a major issue could be quite a large, and ready, export market. Pomegranate is a host for Queensland fruit fly so not all markets may accept fruit grown outside of fruit fly free exclusion zones. I have no evidence to suggest that Mediterranean fruit fly is a problem. Japan and Korea are active buyers of fruit.

Arils supplied, either pre-sorted and shipped by air, or second grade product could be shipped direct to a number of aril extraction plants that are establishing around the world. As the shelf live of Arils is quite short this should be quite lucrative considering the investors in these plants will be wanting to keep them running every day, all year round.

There is potential market with the Asian interest in red flesh fruits With the correct branding and marketing campaign, this could be easily developed using fruit that does not meet first grade specifications and varieties that may be high yielding but contain hard seed.

Domestic Market

Structure

Currently production, quality and unknown varietal sources are impacting on development. Hence virtually all the fruit is finding its way onto the market via the traditional wholesale markets around Australia, and through farmers' markets. Inconsistent product causes issues with repeat buy patterns and hence the consumer does not come back. All composite and third grade products are making their way into the system which penalises the first grade. This product must be removed and used in other ways. There is no consistent grade or brand. It is a very immature market place. Prices achieved for domestic product are very similar to prices for imported product.

Trends

Currently no information is available locally but there is information overseas. In all market demand is growing rapidly. Arils are the largest component in the fresh market. This is in line with the continuing trend of value added options that provide consumer convenience and will be` used as an addition for ready to go meals and desserts. The inconvenience of removing arils and juice in the home will see this market become limited. Further work by consumer experts needs to be conducted. The juice concentrate market will be larger than the fresh market due to availability. The pharmaceutical industry and other possible industries will be developed first by imports until sufficient production and capital becomes available to develop locally. These will be important markets for second grade material when we know what cultivars that are appropriate.

Potential for an Australian market

Australia's position in the Southern Hemisphere should see us supplying fresh fruit after India's crop is sold. This is around March each year. As we better understand the maturity of cultivars, I expect our supply shoulder to push forward from April when we traditionally have local fruit. USA exports have in the past dried up in late January as the quality drops off in the stored fruit. No other country has direct access for fresh fruit imports into Australia other than USA and New Zealand (AQIS website). I am not aware of any implications to Australia's Biosecurity from other countries at this point in time. There are some very early cultivars, which depending on characteristics, could see fresh fruit being available in February each year. Cultivars that can absorb some weather and picked late, may see (with the help of controlled Atmosphere storage) local fruit available into August and September. On the world stage we would ultimately end up competing with South Africa and South America so how far we ship and for how long we will store fruit for is unknown.

At the Produce Marketing Expo in the USA it was apparent in the short term that the USA did not have any excess volumes of fresh or concentrate to start developing new markets. This will no doubt come with time. The leading brand in the USA is retail 475ml bottles of Pomegranate either straight or mixed with cherry, blueberry and or mango for around $4.75USD. Most of our production will occur near existing juicing facilities run by various players in this arena. However, sufficient volume and the right varieties wont be planted for this market before developments can occur. There is some limited supply of cordial and juice being supplied from Turkey. It does not seem to be successful, possibly due to our palate being less tolerant of tart flavours. This is a varietal characteristic and is possibly the result of the extraction process being too harsh resulting in tannins being evident in the drinking experience. I would envisage contracts for processing, much like in wine grape and other juices, being developed with processors over time. Both yield and a better understanding of varieties need to be understood before this proceeds.

As mentioned, a better understanding of varieties suitable for aril extraction or possible dual applications of varieties is needed to be better understood. Aril usage is going to require seedless fruit which is sweet for our local market and this will be or could be different for other markets and may require some blending and have good colour. This product will be developed as a stand alone or as an ingredient with salads and desserts etc. There does not appear to be any being imported due to AQIS

restrictions. This will no doubt change with time. Locally, subject to varietal performance, supply should start in March and finish in July. Arils after extraction have a limited shelf life. Research indicates 12 days for fresh and as low as 9 days for arils removed from stored fruit toward the end of their life. Imports will be a major component of the market as frozen arils do not have a long life either. There is work being conducted around the world investigating the reasons and looking at ways to manipulate this for longer life.

Who are the current and likely consumers?

This is best answered by considering the major market segments. Those that emigrated or whose heritage is from the more traditional production areas around the world, are already quite familiar with various forms. The various claimed health benefits, whether proven or not, will see uptake in various forms as promotion occurs and people seek answers.

Juice, whether fresh or from concentrate, will become fashionable and some will no doubt go from impulse buys to a regular pattern as people seek a regular intake of antioxidants. The market is still growing as penetration increases and the same is expected in Australia and New Zealand. Arils will be purchased in various ways by time poor people. The fresh market will find a natural level and flatten out. What that is I don't know. This market will expand somewhat as we start to export.

Can Australia produce the quality expected?

Australia is often an early adopter for new technologies and products. Also, producers travel quite extensively to seek the best possible systems and answers. Local legislation and food standards will no doubt create or produce a product that is readily accepted. We have the soil, water and sunlight to do it once we better understand varieties performance limitations.

Is there demand for any one pomegranate product over another?

Anecdotal evidence, of which on-going consumer monitoring is being undertaken overseas, would suggest that Australia will more than likely follow trends in other countries. This is particularly so for an increase in demand for the juice and arils.

Are the consumer needs being met by the current products?

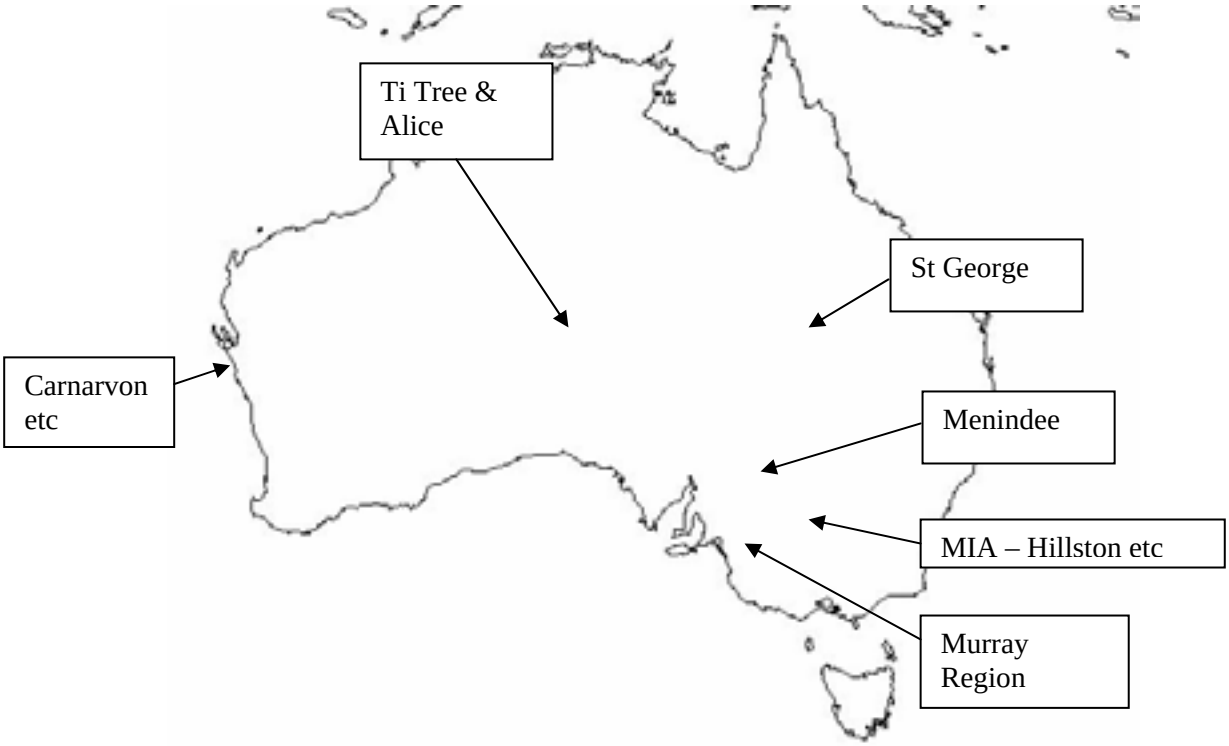
This will be a new market segment and will need to be developed. What this true size will be ultimately is unknown. However once some data is collected off-shore we can model this against our own population size and export potential. It is expected that there will be 1000ha more producing over the next 5-10 years worth an estimated $50M or more. Job creation may not be high as people migrate from other crops to pomegranates. It will not be about bringing new land into production but rather replacing non viable crops with something new.

Production

There is no significant volume as the majority of the reported 200ha planted around Australia has not reached production stage. Nearly all this is planted in or around the Murray Darling Basin and some in Western Australia.

Type of Conditions Needed

The following map of Australia best highlights the most suitable production areas that have mild-temperatures to sub tropical as it will naturally adapt to areas that have cool winters and hot, long and dry summers. It is extremely drought tolerant with some ability to tolerate salty water. Soil types can be from calcareous to alkaline in nature and preferably deep and well draining. Rainfall in autumn can affect yields as the fruit will crack and even more so when water is short. Areas that receive regular summer rain are probably not suitable as potential production zones. The areas with permanent water highlighted would allow production to occur locally for a number of months before relying on storage to extend the supply window.



Fertilizer requirements

Fertilizer requirements need to be developed using existing information that can be obtained from places like Israel and the United States. Evidence suggests they will be quite hungry for potassium, nitrogen and phosphorous if the soils are depleted. Trials need to be established taking into consideration soil depth, water holding capacity, irrigation type and volume of water used. No documentation is available on the ability of any particular type of pomegranate root system to extract either water or nutrient. What we are taking from the paddock will be determined by yield.

Pests and diseases

Around the world, literature cites powdery mildew being a problem in Bangladesh and Bacterial Blight, Anthracnose, Bacterial Spot / Canker being a problem in India and other places. Some of this will depend on soil types, drainage and rainfall. The USA does not seem to be suffering from any real problems.

Pesticide registration needs to be looked into more so for herbicide usage. As mentioned Pomegranates are a host to Queensland fruit fly and this could jeopardise market potential for exported fruit from any early region that may become established. Other pests are likely to see pomegranate as a host and so constant crop monitoring will be needed.

Water Usage

Pomegranates are a deciduous tree so they will not require the same water as a citrus tree or something similar. Local evaporation, in crop rain of use and a decision on whether maximum yield are necessary, needs to be considered. A lot of production around the world is not being watered to its maximum and are often supplementary irrigated, therefore we are unsure on yield potential and return per ML. Using local crop and Food and Agriculture notes from the United Nations for similar crops, it is estimated that 9-12MG's per ha is required without any rain. This needs to be further investigated.

Most likely best varieties for production of products

This is still unknown due to the number of cultivars or selections and should be tested. Some cultivars are dual purpose. Around the world they quote thousands of types. It is important to enquire where the nursery receives their material and support this with some evidence. Over time the generic name Wonderful (Type) should be replaced with a number or another name. Types that are sweeter rather than sour or tart should be selected. Each market has a different requirement. Yield and maturity will be very important. For fresh and concentrate I would plant a reasonable percentage to the True Californian Wonderful and the balance to a range of cultivars with different maturities that are seedless for the aril market. This will be trial and error until more work on this has been done. From a fresh fruit point of view, Wonderful (California) fruit is possibly too large. From a juice point of view (whether fresh or concentrate) it is high yielding and sometimes is blended with other cultivars or old stock to improve flavour. It does have hard seed so is not the preferred cultivar for aril extraction. Comments from the UK market when supplied fresh is the strong after taste takes getting used too.

Many claims are being made about the characteristics of each with most untested here in Australia so it is very much buyer beware.

Production risk factors for new growers to consider

The following considerations are relevant to growers:

- Late frost
- Rain when fruit is mature will cause fruit splitting and more so if you under-water the fruit, external characteristics are quite leathery and cannot expand quickly
- Pomegranates are a host of the QLD fruit fly
- Source of germplasm and its authenticity
- Picking immature fruit. Some cultivars are the same colour from fruit set until fruit maturity making it quite difficult to determine if it is ripe or not. It is non determinate in flowering and so flowering can occur over a 4-6 week period and longer, resulting in a number of picks which can be quite expensive
- Varieties with hard seed should be avoided
- Very limited knowledge on what could be a minor or serious pest, whether it is a native or introduced in Australia.

Can pomegranates be readily incorporated into existing farm systems?

There is the opportunity to use existing trellising used for wine grape, table grape and dried fruit production to support new planting production systems that could be used to, or developed for, machine harvest. This style of production also decreases wind rub on fruit destined for the fresh fruit market hence a higher return as fresh market fruit tends to be the highest paying market. Fresh fruit should not be machine harvested as the fruit should be cut from the plant rather than pulled or beaten off.

Irrigation technology will not need modifying. Mechanical harvesting of processing fruit will need some investment by either existing manufactures of similar equipment in other crops or the opportunity for new players with the capital to invest.

Plantings are typically done in a more conventional style to fit in with existing machinery and water application equipment. Row widths and tree spacing need to be trialled depending on how quickly you want to be producing fruit

Are there nurseries in Australia 'geared-up' to provide trees for new growers?

The biggest problem for existing nurseries supplying trees to growers is having an understanding of what particular cultivar it really is. Various State and Federal research sites in the 50's and 60's brought material into the country for evaluation. Over time, trees at Stanthorpe QLD, Merbein Vic and Dareton in NSW were removed as funding either dried up or priorities changed. The term Wonder become generic resulting in anything and everything that resembled a pomegranate being called Wonderful. The nursery industry has sourced most of the material from these locations. Records of introduction and the parentage have been lost over time. Western Australia Department of Agriculture has also imported material and this need to be qualified as to what it actually is.

Global Plant IP, when reviewing the plant material available, recognised that what was available in Australia, is either not the true Wonderful or could not be validated as being the same, with the possible exception of some material in WA. Variations occurred in fruit maturity, size, fruit colouring (both external and internal), suckering and the fact that the true Wonderful is quite thorny. The true Wonderful was imported to Australia in early 2006. The genetics that are here already could in fact be Grenada, Early Wonderful, Foot Hills or any one of hundreds of types found around the world. If we are to do quantitative or qualitative trials of the genetics for developing the industry, it will be important to know more about what we are actually planting. Re-importing fixes this issue very quickly.

The real Wonderful variety was a chance seedling discovered in Florida, and then taken to California where it is now the predominant cultivar.

The following nurseries are among those that have been actively supplying material for small commercial plantings:

- Birdwood Nursery QLD
- Sunraysia Nursery Victoria
- Fixed Stars WA.

Back yard trees can be bought at nurseries that sell for home use eg Bunning's. Birdwood nursery stocks the re-imported and true Wonderful. Fixed Stars in WA is the only nursery actively sourcing new cultivars from around the world. Numerous people have connections with Turkish and Israeli breeders.

Processing

What capital equipment is required for processing arils and juice?

Arils

Currently the major provider of aril extraction equipment is the Joran Metal Works Company from Israel. I have not determined whether other groups are trying to develop equipment. This equipment can now be found beyond Israel and is being used in Europe, Turkey and Spain. No one has yet invested in the technology in Australia. As mentioned, one unit costs around $500,000.00 AUS. In addition, other equipment will be needed to both house the unit and seal the end product into tamper proof containers. Spending $1M may not be unrealistic. Production from one unit is quite modest.

Juice

This market segment would be best developed by existing players in this category. Similar aril extraction technology may be needed as the juice is in fact found in the arils. Removal of the outer shell and inner structure must be done in a way to prevent tannins being extracted as the tannins can influence the flavour of the end product. Total costs would be relative to market share or size that you are attempting to develop.

Can Australia access this equipment – purchase or produce?

This should be possible once we have sufficient local product to justify the capital expense.

Research & Development

Opportunities for productivity enhancement through improved technology

Production knowledge is very limited as the industry is in its infancy. This project was undertaken to identify more about what we don't know. Further funding is going to be required to truly answer this. Globally we are being challenged to participate. Existing players are investing in researching the health benefits, marketing and breeding.

Each cultivar must be trialed to gain an understanding of its potential in the marketplace. This will require consumer feedback.

Is there currently any domestic R&D being undertaken?

No evidence was available to suggest any government R&D apart from a grant to Lewis Agriculture by the Federal Department of Agriculture, Fisheries and Forestry.

Important links with other overseas research providers

Those that have published data are listed either through acknowledgement or via references. The first International Symposium on Pomegranates was held in Turkey in October 2006. Only two Australians attended. These documents cite a number of other researchers who should be contacted and possibly visited to better understand the issues and what they are doing as far as research and development. Most of these are found in third world countries and if we can learn from them we will not have to redo the research. This document is available by contacting the author of this report.

Barriers and can RIRDC assist in overcoming these?

There is a need to bring together a number of experts in relevant fields to process what we do know, collect the evidence and proof this up. Some private groups are already trying to understand this.

RIRDC assistance and guidance in constructing an industry will be invaluable. More informed information is needed on the true health benefits; commercial potential will come from establishing a genetic resource centre and better understanding the desired characteristics for each market segment. Further funding will be needed to assist in collecting this material and land made available for conducting production studies.

A list of existing stakeholders needs to be established and a working group created that sets some initial outcomes so we can confirm both the short and long term using this document as a starting point.

Conclusion

Very little is published as production practices are very old and in most cases have not changed much over thousands of years. Future funding is required to develop some relatively basic components of any farm factory.

Previous to putting this report together, the author has visited the Californian industry a number of times, Fruit Logistica in Berlin, the Annual Produce Marketing Association Expo, talking to stakeholders in the modern production system. Actually stepping inside production value added facilities is very difficult as each is vying to protect their own intellectual property.

Propagation techniques and the use of rootstocks to increase yields via higher densities should be trialled and a list of desirable characteristics generated. Post Harvest labs should carry out storage trials, increasing the shelf life of certain products. A breeding program could produce a cultivar with fewer thorns that suckers less, and improved fruit colour development and staggered maturity.

A genetic resource centre needs to be established that includes all current plant material available and for adding to as they are collected from around the world. This could be conducted with an existing one used for another crop eg grape vines to expand their income stream and not be so reliant on one crop. Virus work is an unknown.

The following countries should be visited to further evaluate resources around the world dedicated to breeding which are focused at looking at yield, soft seed, and rain tolerance at harvest time. The National Clonal germplasm Repository – Tree Fruit & Nut Crops at the University of California site in Davis would be worth reviewing as there is a collection established there of older varieties from around the world. Countries that should be visited include India, Iran, Turkey, Sicily, Israel, Morocco, and Spain. At the same time an update on activities in other Southern Hemisphere countries could be obtained through visits.

Mechanical pruning and harvesting of fruit to reduce the labour associated with fruit production for processed markets will be important as the crop moves from novelty status to commodity.

As Australia is a dry climate with a shortage of water, more work needs to be undertaken on what effect reduced water and or deficit irrigation may have on both crop yield and quality. The true return per ML is still very academic at this stage, with not enough information collected to quantify this.

True production costs are relatively unknown as very little is published other than from California. This data is for flood irrigation which is not a practice we should be encouraging in the future. Actual true crop requirements for nutrients needs to be developed and proofed up in the different production areas.

Post harvest shelf life information is required of the products in the various market segments. The technologies available now and what we can do to improve these are a good starting point.

Post harvest control of fruit fly and other pests may allow improved access to undeveloped markets, or to markets that exist that are already taking Northern Hemisphere fruit.

Before the market is developed to a much higher level we should assure ourselves that we are not investing capital either in production or value adding unless we have some of the answers. It definitely deserves further investment and will need further funding to develop the industry.

Finally, pomegranates do have potential as a new crop or a replacement for poor returning crops.

Recommendations

If significant research or health studies are undertaken to understand the unique properties of the pomegranate, these studies indicate that a pomegranate has both disease and cancer fighting abilities. Indications to date suggest that Pomegranates (when compared to cranberries) are several times stronger at attaching itself to viruses inside the body and carrying them out relieving bladder and urinary tract problems. Its ability to lessen heart problems and assist with prostate cancer is great news. A lot has been written too about the health benefits of antioxidants.

We now need to look at genetics, production methods and technology in the field. Outside of the field we must develop the technology to value add and focus on the larger market-juice concentrate and arils. It is a very promising new crop that has a potential to be worth a considerable sum and benefit as a replacement to other categories that are under stress. It is reasonably cheap to grow but we must also better understand the 3 P's Price, Production and Profit level. The adoption of similar recommendations from other primary industry position papers developed in recent times before we run again into the same issues is important as well.

This document supports the need for further funding as there is a considerable amount that w don't know. We now ask that some science be bought into the argument to guide us through the process.

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Pomegranate

Investment background

RIRDC publication number 08/153

The Pomegranate (*Punicum Granatum*) is mentioned in history as far back as in the writings of Old Testament. Very little is really known about the fruit other than it has very high levels of antioxidants. Its history in Australia has been primarily as a back yard ornamental. The original source of plant material is suspected to have come from somewhere between Iran to the Himalayas in northern India. Global production is mainly centred in the Mediterranean and Middle Eastern regions.

This study was conducted to uncover the extent of pomegranate production in Australia and provide recommendations to RIRDC for further investment. The report looks at the potential of not only the juice market, but also, fresh product and arils (fleshy seed cover containing juice). The intention of the report was to provide a quick 'snap-shot' of the industry for future investment decisions and is based around a series of questions supplied by RIRDC to the author.

The report is initially targeted for use by RIRDC in assessing future investment of Federal Government funds into this developing industry; however, it will have benefits for any new entrant with an interest in pomegranates.

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