

**Australian Pomegranate Industry Strategic Plan 2020-2025**

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# 1.0 Executive Summary

The Australian Pomegranate Association (APA) Strategic Plan (the Plan) provides a roadmap to guide pomegranate research, development, extension and market investment between 2021 and 2025. The primary outcome of the Plan is to increase market share, align priorities and develop this niche sector to reach or exceed a sector turnover of $10 million in the next five years, an industry benchmark set by the 2017 Coriolis Report.

The Plan, which is driven by AgriFutures and the APA, involved an extensive national stakeholder engagement process. Pomegranate growers, researchers, advisors and industry representatives were surveyed and engaged. Along with the stakeholder consultation, the team reviewed Australian industry reports and the national/international literature to gauge research gaps.

The engagement survey and literature scan identified gaps in research, knowledge and information relating to pomegranate production, variety performance, agronomic management, health benefits and market insights in an Australian context. In fact, many Australian growers are reliant on international literature and knowledge to support the operations. It is clear significant investment is needed to provide Australian growers with Australian knowledge, to drive sector growth.

To drive sector growth, the plan reflects seven core objectives, which consider growth pillars, actions and outcomes. Within each objective, the key areas for investment are presented. While a range of recommendations are presented in each objective, the following priority actions were identified:

1. **IMPROVED POMEGRANATE AGRONOMIC MANAGMENT:** *Utilise existing industry resources including genetics, planted trees, agronomic skills and grower capacity to develop agronomic management packages for existing and new industry participants (i.e. an Australian Pomegranate Management Guide which details fertiliser, nutrition, irrigation/water use efficiency, disease, canopy and chemical best-practice management).*
2. **VARIETY KNOWLEDGE AND DEVELOPMENT:** *Identify key varieties to consider importing for future trials. Establish national variety trials to review performance of national and international varieties to evaluate their yields and performance under different growing conditions.*
3. **NEW MARKET OPPORTUNTIES AND GROWTH:** *Conduct market research to better understand consumer demands and different end-use opportunities, resulting in a market development plan.* *Drive value chain thinking. Develop innovative marketing campaigns which raise awareness of the health and nutritional benefits of pomegranates.*
4. **BIOSECURITY PREPAREDNESS:** *Further develop biosecurity measures including detailed risk assessments on key threats to the integrity and viability of the local, Australian industry.*
5. **ENHANCED PRODUCT QUALITY:** *Better define the national product quality and size specifications.*
6. **NEW AUTOMOATION TECHNOLOGY:** *Establish programs which support the development and adoption of new technologies/innovations which improve productivity and profitability.*
7. **INDUSTRY ADVOCACY:** *Build the profile of the APA so it can continue to be the voice of Australian pomegranate growers, and increase communication outputs so stakeholders are informed and aware of new knowledge, resources and opportunities. Support the industry through new skills training, leadership, governance and planning.*

Through the implementation and adoption of this Plan, the pomegranate industry will grow. Its actions will ensure the industry has access to high quality varieties backed with best practice knowledge and agronomic management information, access to domestic and international markets and access to new technology and innovation. The Plan will also raise awareness of the health benefits of the pomegranate, and will work to increase market demand, ensuring the produce is valued and sought after by the Australian consumer.

**The Australian Pomegranate Association (APA) Strategic Plan Overview**

This Strategic Plan provides AgriFutures with an important foundation for decision making as it represents the needs of growers, industry and research partners alike and is not biased to any one person, business or opinion.

**VISION:** A productive and profitable Australian pomegranate industry which delivers consumers a year-round supply of a consistent, high-quality and nutritious product.

**MISSION:** To drive innovative research, development and extension programs which support growers and advisers to produce higher quality and higher yielding fruit.

**OBJECTIVES:**

**OUTCOMES:**

A thriving pomegranate industry which has access to high-quality varieties backed with best-practice knowledge and agronomic management information, access to domestic and international markets and access to new technology and innovation.

A growing national and international industry which is valued by consumers.

**VARIETY KNOWLEDGE AND DEVELOPMENT**



**NEW DOMESTIC AND INTERNATIONAL MARKET OPPORTUNTIES**



**IMPROVED POMEGRANATE AGRONOMIC MANAGEMENT**



**ENHANCED PRODUCT QUALITY**



**INDUSTRY ADVOCACY**



**NEW TECHNOLOGY**



**BIOSECURITY PREPAREDNESS**



# 2.0 About AgriFutures

AgriFutures Australia (a trading name of Rural Industries Research and Development Corporation, RIRDC) is an organisation that focuses on the future of Australian agriculture. AgriFutures lives and works in the regions and represents the interests and aspirations of farmers and rural communities. The vision of AgriFutures is to grow the long-term prosperity of Australian rural industries.

AgriFutures has clear goals for its support of Emerging Industries; it seeks to create five $10m+ industries in five years. AgriFutures suggests there is a great market opportunity for Australian pomegranates, and so invested in the strategic plan for the sector, with the intent of identifying priority RD&E outcomes and setting a clear industry action plan. Through the support of AgriFutures, the Australian pomegranate Association has driven this plan, and is pleased to present the vision, mission, objectives and actions required to progress the industry.

A scan of existing, publicly available literature suggests that the Australian pomegranate industry is a potential growth industry and requires targeted research, development and extension activities which build on existing platforms. AgriFutures has previously invested in scoping reports and strategies for the pomegranate industry (including some when operating as RIRDC). Many of the reports present similar recommendations, indicating that the issues have not been addressed over the past ten years, and that investment in research, development, extension and communication is required to support and progress the industry. Note that these reports are acknowledged and summarised in the APA literature review, which has underpinned this strategy.

This Plan presents research, development, extension and communication priorities to drive the future growth of the Australian pomegranate industry. Seven key objectives have been identified, with a range of growth pillars, actions and outcomes presented.

## 2.1 THE AUSTRALIAN POMEGRANATE INDUSTRY

In Australia, pomegranates are considered an emerging industry, with commercial production beginning in the early 2000s (Sosnowski et al 2019).  Since this time, the industry has slowly grown with growers and processors building orchards, markets and sales in whole fresh fruit, juices, ready-to-eat and frozen arils and nutraceutical (albeit small) markets. There are no listed statistics of the Australian pomegranate industry in the Australian Bureau of Statics *Value of Agricultural Commodities* report (2019/20), as the industry is captured in the ‘Fruit and nuts - Orchard fruit - All other orchard fruit n.e.c.’ category, which has a gross value of $328,613,673.23.

It is important to note that 2021 production trends will be validated by a separate AgriFutures research project, which is collecting industry data on niche or emerging products, of which pomegranates is one. This report will be updated to include those figures as they arise.

## 2.2 Key Market Drivers

Key drivers for the Australian pomegranate market are the significant growth signals in other markets, the opportunities for health benefits and alternative uses and variation in global markets to provide continual supply. Industry statistics (AgriFutures 2020, viewed online) state:

* global pomegranate demand doubled every three years in the 2000s, outstripping global supply
* pomegranate juice market in the United States of America (USA) expanded by more than 750%, into a US$66 million retail industry between 2001 and 2005
* < 1.25% of global production originates from the southern hemisphere and of that, less than 2% is produced in Australia
* significant opportunity exists for Australia to market a counter-seasonal product into the northern hemisphere.

In 2017, AgriFutures commissioned the Coriolis report, titled *New Opportunities in New & Emerging Agricultural Industries in Australia*, that identified pomegranates as a high-potential industry for growth, reaching or exceeding a contribution to the Australian economy of $10 million in the next five years. The report states that there is limited production in the southern hemisphere and that growth is needed. The report identified that the key drivers of growth include “super food” status, health benefits (antioxidants, dietary fibre, antibacterial properties), increasing demand from food service industry, traditional medicinal uses and counter seasonal supply. The report recognised value-added opportunities in frozen arils, juice, flavouring, powders, syrups, jams, ice cream and confectionery, tea, wine, grenadine, nutraceutical products, cosmetic products and dyes.

The Coriolis Report (2017) identified domestic competitors such as imported juice and frozen arils, other juices and other high antioxidant foods and recognised that main market competitors in the international market include India, Iran, USA, Turkey, Spain, Israel, South America. Other risks identified included the low understanding of tree health (dieback), three years to fruit, peak production at 5-6 years and the fact that whole fresh fruit are fussy/messy to deal with for consumers. This Plan considers these risks and presents a number of actions to increase Australia’s competitive position.

In addition to the above drivers, the industry engagement survey and literature review identified additional market drivers, these include:

* Pomegranates contain important health and nutritional phenols, which have the potential to enhance human health. Consumer awareness is important to grow market use and consumption, and alternative markets (skin care, nutraceutical).
* Australian consumers seeking Australian grown produce, not imports. This indicates room for frozen product growth, and increased product delivery throughout the year (noting new varieties or controlled growth options must be considered).
* Growers wanting to diversify their production, seeking high-value crops which are able to grow in dry/hot conditions.
* The nutraceutical industry seeking fruits with unique health properties.

The survey also identified that the industry is optimistic about their future, with the following points summarising the ideal future vision:

* The industry is underpinned by and utilising new technology to improve market efficiencies and reduce reliance on labour.
* Growers have access to a range of varieties supported with research evaluation trials, and a sound agronomic management guide.
* Growers and industry have access to Australian research which is calibrated to Australian conditions i.e. research underpinning nutrition, diseases, pests, soils, pruning, irrigation etc to produce high yielding crops.
* Pomegranates are a staple purchase product of Australian consumers, and their culinary use and health benefits are understood and valued by domestic and international consumers.
* Australia can supply its market all year round and is selling a consistent product into the international market.
* Australia has clear domestic and international markets, supported by a working value chain
* Australia is the primary provider of arils and fresh pomegranate in Australia.
* That growers, advisers and value chain partners are supported by transparent and sound advocacy from their industry body – the Australian Pomegranate Association.

3.0 IMPROVED POMEGRANATE AGRONOMIC MANAGEMENT

To improve agronomic management in the Australian pomegranate industry, actions must address growers’ understanding of how current varieties perform, and the impacts of management practices including disease, pests, nutrition, agrichemical, soil, irrigation, canopy management and holistic farm management is required.

Growers surveyed indicated that access to an Australian growing guide would improve their productivity and profitability. Currently, many growers utilise international literature and growing guides to support their production and many indicated that they would like access to local research, knowledge and information.

This section highlights the key actions required to improve pomegranate agronomic management in the areas of disease, pests and growing issues, agrichemical, soils, canopy management and irrigation. While each of the actions are of high priority, there was a consistent trend in the survey data that a priority action is the need for an Australian best-practice management guide. As such, a priority action for its development is recommended for immediate implementation.

**PRIORITY ACTION**: *Utilise existing industry resources including genetics, planted trees, agronomic skills and grower capacity to develop agronomic management packages for existing and new industry participants (i.e. an Australian Pomegranate Management Guide which details fertiliser, nutrition, irrigation/water use efficiency, disease, canopy and chemical best practice management).*

The following sections further highlight the issues and opportunities for action in pomegranate agronomic management.

## 3.1 DISEASES, PESTS AND GROWING ISSUES

Little is known about pathogenic susceptibilities of pomegranates in Australia. Specifically, growers suggested the following priority areas for future investigation:

* Fruit split management: research to investigate and understand the drivers of fruit split i.e. irrigation regime / rainfall (amount and timing) on mature fruit and its potential to cause fruit splitting.
* Varieties: Access to, and understanding of appropriate cultivars, which suit different microclimates / soil types / disease pressures throughout Australia (there are no national vareity trials which are independently reviewed to inform decision making) \*See section 4 on Varieties.
* Plant Architecture: Better understanding of the impact of genome x phenome x environment on plant archtechture (fruit vs stem) i.e. phenomics research.
* Biosecurity: Understsnding how to reduce the impacts of fruit fly i.e. pomegranates as a host of the QLD fruit fly, how the risk be better managed or reduced to reduce export market access risks.
* Frosts: How to manage the canpoy or flowering time (i.e. nutrition or other) to mitigate frost risk as late frosts in some regions are causing floret damage at flowering.
* Thrips; spray options, timing and apprach.
* Managing sunburn (note some Australian research has demonstrated that damage reduces bioactive parameters in the juice and decreases the total phenol content and antioxidant activity during fruit growth and maturity (Weerakkody et al (2010)). Further research is needed to determine the effect of sunscreen treatments on the internal quality of the juice when grown in milder conditions.
* Research management into *Phytophthora* sp.
* Pomegranate fruit rot disease *(Alternaria alternata) (*also known as “heart rot” or “black heart,” is a major pomegranate disease that impacts production worldwide. Growers are after better fungicide management approaches and varietal resistance. There was no published literature which tests fungicide options, timing of applications and rotations with different modes of action in the Australian pomegranate market, yet Australian pomegranate growers are having to manage this disease. This type of information is fundamental to support best practice management.

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| **Priority Actions - DISEASE AND PESTS**  |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOMES  |
| Best practice management.  | Development of a pomegranate disease and pest management guide, which looks at chemical control options, integrated pest management, management of sunburn, irrigation and overall production. Current guides being utilised are from overseas and are not relevant to Australian conditions. | Improved crop performance. Increased quality. Reduction in chemical use.Optimisation of water use. Reduction in production costs.Adaptation to climate change. |
| Guides for managing sunburn.  | Further research, development and extension of sunburn management, which is a major problem across the industry.Review of shade vs sunscreen options for pomegranates. |
| Understanding of soil borne diseases.  | Research into soil critical values of soil borne diseases and how to manage these in pomegranates. i.e. *Rhizoctonia* |

## 3.2 Agrichemical

A review of agrichemicals available for Australian pomegranate growers was conducted by Jobling et al in 2010. This found only two insecticides (fenthion and endosulfan) and one herbicide (fluazifop-p) were registered for use on pomegranates in Australia by the APVMA. At the time of publication of this strategic plan, one post-harvest fungicide (Scholar) is registered for use on pomegranates, and only one insecticide (dimethioate) was available for use under permit. Non-selective herbicides were not specifically registered for use in pomegranates but were potentially available under general use directions (Jobling et al 2010).

Lobbying by the APA resulted in the introduction of off-label chemical usage for South Australian growers, with horticulture exemption approval granted by PIRSA in January 2021. This enables members of the Australian Pomegranate Association to use registered agricultural chemicals for off-label usage if they participate in the quality assurance schemes, Freshcare Food Safety & Quality Edition 4.1 or HARPS Version 1.0. Approval is granted on the conditions that:

* Chemicals are used at the correct rate and frequency
* Maximum residue limits are complied with
* Mandatory label statements are followed
* Persons using the chemicals have the required qualifications.

This follows earlier work by the association to apply for minor-permit use of the fungicide wound protectant Tebuconazole (Greenseal). This permit approval is for APA members only and applies in all states in Australia. Painting pruning wounds with Greenseal is a common management strategy for preventing trunk diseases, including many forms of dieback.

Victorian pomegranate growers were already allowed off-label usage however, further work by the APA should centre on an extension to all growers nationally for changes to chemical labels to include 'crop groups'.

Constraints in the use of agricultural chemicals on pomegranates has been identified by APA members as a priority issue. The association continues to act on this issue, calling for changes to chemical labels to include 'crop groups' at a national level. This would enable emerging industries to align chemical registration with similar crops with existing registration.

The APA member engagement survey indicated that there are still major issues with access to chemicals on-label, and that the pomegranate industry is suffering due to their size, which means they are not prioritised to be on-label. A priority action is the need to improve the pathway to obtaining access to registered chemicals and identifying the how, when and by whom to get it done.

The survey did not identify any specific priority action for organic pomegranate production. However, this does not mean it not important from a consumer perspective. Further work in consumer research should identify the market needs for organic vs conventional pomegranate options.

Initial scanning of the literature, plus a review of initial survey results suggests that the following growth pillars and priority actions should be considered:

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| AGRI CHEMCIAL  |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Clear pathway to access of chemicals.  | Review the pathway for gaining access to registered chemicals and identify how, when and who can support a clear pathway which achieves national consistency and access to chemicals which support the industry.  | Access to chemicals which support best-practice disease and pest management.  |
| Access to fungicides, herbicides and insecticides to support best-practice crop management.  | Advocate on behalf of grower members to change labels to include ‘crop groups’.  | Better crop protection against disease, pests and insects. Improved yields and productivity.  |
| Establishment of trials to investigate control options | Review of fungicide options, timing of applications and rotations with different modes of action. |
| Development of fungicide management guides  | Need fungicide application guidelines to support best practice during flowering seasons (i.e. plant can set flowers every 60 days) and understand how to thin fruit - and spray to manage. Need timing of application guides. This should be overlaid with timing of spraying. | Best practice management to control disease and minimise resistance.  |
| APA continuing to advocate on behalf of growers | Working with Hort Innovation and the APVMA to instigate new chemicals on label to support pomegranate growers. | Access to chemicals which help growers manage disease and pests.  |

## 3.3 Soils

Many growers and industry representatives surveyed stated they seek international advice and literature to inform their soil nutrition management plan, with many stating a lack of research to inform:

* soil nutrition management plans i.e. what nutrients to apply and when
* relationship between timing of nutrition and fruit yield and quality
* impact of nutrition on flowering and fertility
* understanding the impact of soil borne diseases on plant yield i.e. Rhizoctonia.

Growers also expressed interest in learning the relationship between andromonoecy in pomegranate and nutrition (i.e. how N, P and K impact the development of hermaphroditic (bisexual) and staminate (male) flowers. Feedback from the industry survey also found that growers are seeking more knowledge on the relationship between soil type, soil borne diseases and nutrition. This was seen as a limiting factor for industry expansion in Australia

AgriFutures (2017) states that Australian pomegranate orchards have been established in the Murray–Darling Basin, from southern Queensland (St. George), to southern New South Wales (Lachlan and Murrumbidgee valleys) and northern Victoria (Shepparton), across to South Australia (Adelaide region, the Murray Mallee, Clare Valley and the south East); and in Western Australia, near Carnarvon and south of Perth. At a minimum, growers are seeking soil characterisation and variety trials in these regions, plus research to inform a better understanding of which soil types support best growth, and associated management plans.

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| SOILS  |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Review and compilation of existing soil maps.  | Review and compilation of existing soil maps (i.e. through CRC for Viticulture) to cross check location of existing pomegranate farms and assess soil types.  | Understanding of farm locations and soil types.  |
| Better understanding of soil microbes and their role in pomegranate growth and function.  | Research into understanding the soil microbe interactions and how these can be managed to improve yield.  | Best practice management to improve quality and yield.  |
| Better understanding soil borne diseases and their impact on pomegranate growth and function.  | Development of soil borne disease tests (i.e. PREDICTA B) and yield response curves for the pomegranate industry so that risk levels and management plans can be developed.  |
| Fertiliser management plans.  | Research to develop soil critical nutrient levels for key nutrients (N, P and K). Development of a nutrition guide which helps inform application timing and rates, and impact on flowering time and yields.  |
| Understanding the impacts of nutrition on flowering and fruit quality.  | Management guides for macro and micro-nutrient levels, and their impact on fruit size, colour and quality.  |

## 3.4 CANOPY MANAGEMENT

There is no readily identifiable published literature in Australia which provides best practice guide on pruning techniques or canopy management for pomegranates. Growers in Australia are seeking clear guidance on the best practice approach to pruning, plus opportunities for automation. Advice is also sought on planting densities in Australian conditions. Growers suggest that harvesting the fruit is one of the biggest labour costs, with many growers having to cover up to four passes to manually pick the fruit. Growers are seeking skilled labour to support this work, with many suggesting that it is hard to find and retain skilled fruit pickers. Alternatively, they are seeking improved mechanisation or automation offerings.

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| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Trellis and espalier guidelines for best fruit production.  | Prepare a management factsheet for new pomegranate farmers which helps guides trellis / espalier set up to drive fruit production and ease of harvest.  | Skilled workforce. Highly productive trees.  |
| Skilled pickers  | Development of training programs to support the training of seasonal pickers or for utilisation in Horticultural production training packages. | Reduce training costs and increase consistency in quality. |
| In-season canopy management guidelines  | Thinning methods to produce good sized fruit and colour.  | Productive trees which produce consistent, high quality fruit.  |
| Genetic research  | Genetic research to understand the drivers of flowering and how these can be manipulated.Development of new early, mid and late maturing varieties which help spread risk of frosts AND drive a longer market offering.  | New varieties which help meet market demand.  |
| Pruning  | Review the different pruning approaches to develop a clear guide for growers which informs best practice management to increase yields and fruit production.  | Productive trees which produce consistent, high quality fruit |
| New automation offerings  | Undertake agtech audit to identify if any existing technology can be modified adapted to the needs of the pomegranate industry. | Leverage of existing research and development  |

## 3.5 Irrigation

There is little peer-reviewed or publicly available data which informs best-practice irrigation management, and water-use efficiency of pomegranates in Australia. There is significant research needed to validate application rates in different rainfall zones and soil types.

Pomegranate growers in Australia are working to adopt a range of technologies to support their orchard. Many are using soil moisture probes (e.g capacitance probes) to collect data and characterise the soil before, during and after irrigation events. Others are utilising xylem flow probes and developing unique systems which respond to the individual plant’s needs. Those adopting these types of technologies are generating knowledge and systems specific to their enterprise and are benefiting greatly. Again, there is no peer reviewed research or validation to extend this knowledge to others. Those who are utilising these systems are ‘innovators’ and ‘technology leaders’ seeking answers through their own investment, time and money. Systems can be purchased with support through private providers. More research is needed to understand and optimise water use in a range of soil conditions.

There is strong feedback from pomegranate growers – they are seeking clear information to understand how to grow pomegranates in local conditions.

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| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Development of a best-practice growing guide, which provides clear agronomic management plans for each variety in each soil type, region and environment.  | Development of a growing guide which is supported by local research trials which validate: * Best practice irrigation for Australian pomegranates, comparing advantages and disadvantages of several irrigation strategies to advise on how water deficits during flowering and fruit impact yield, fruit size and chemical composition
* Review of mulch type and strategy to reduce soil evaporation
* Irrigation regime to reduce split.
 | Productive trees which produce consistent, high quality fruit.Better understand the cost of production |
| Calibration and validation of irrigation scheduling tools such as xylem and sap flow monitors  | Replicated trials which review the use of irrigation precision ag programs in pomegranates, which investigate rate, scheduling and actual tree water needs.  | Productive trees which produce consistent, high quality fruit.Better understand the cost of production |
| Training and extension in irrigation  | Delivery of extension and training programs to drive better water management.  | Productive trees which produce consistent, high quality fruit.Better understand the cost of production |

4.0 NEW VARIETY KNOWLEDGE AND DEVELOPMENT

Growers and advisers are seeking access to independent variety performance information, with many suggesting validation trials to review the performance of different cultivars in different environments, soil types, nutrition responses, irrigation schedules and tree training/pruning techniques environments. There is international research which provides comparative performance of common pomegranate varieties, however, there is scant published data in Australia. The absence of an Australian agronomic manual to drive the optimal production and post-harvest production of pomegranates for the industry was also identified.

While a range of actions have been identified, the below priority action is recommended for immediate action.

**PRIORITY ACTION**: Conduct national variety trials to review performance of varieties under different growing conditions.

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| **VARIETIES**  |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Development and validation of new varieties and their growth traits (i.e. disease resistance, yield, nutrition requirements) through publicly funded RD&E. Assessment of variety performance through national variety evaluation program. | Development of a National Variety Trials program which tests and validates variety performance in different soils and climatic zones (rainfall, disease pressure) etc and growing regimes (fertiliser inputs).  | Ability to understand variety performance in different regions. Development of consistent and high-quality products.  |
| Access to new varieties which are supported by agronomic trials and evaluation across different regions of Australia.  | The development of an independent national varieties trial program which tests the performance of varieties over a range of locations and seasonal variations (soil types, rainfall zones etc) | National pomegranate research trials testing key varieties. A national varieties trial guide which informs variety performance under a range of environmental growing conditions.  |

# safe Icon 37770605.0 NEW MARKET OPPORTUNTIES AND GROWTH

Australian pomegranate growers can supply the Australian market from January to October, however, supply is usually exhausted by June (Lewis 2021). Lewis (2021) states that imported US fruit supplies local market from October to December. Feedback from a range of growers and industry representatives is consistent with the statement of Lewis (2021) *Pomegranate Growing Report* which states that local fruit supply is insufficient for national major chains, and that there is a significant opportunity for volume and production to increase in Australia. Anecdotal evidence from pomegranate retailers suggests that there is an increasing demand for Australian pomegranates in the Australian market, with consumers looking for Australian produce in the form of fresh, frozen and value-added products which offer health benefits.

Australia is a minor player on the international market. AgriFutures (2017) states that India is one of the largest producers of pomegranates, followed by Iran, the United States, Turkey, Spain and Israel. Less than 1.25% of world production is in the southern hemisphere (predominantly South America and South Africa), and Australia only produces 2% of that 1.25%. While many of those surveyed were keen to seek export markets, and some businesses were actively exploring future opportunities for export, there were a range of actions which needed to be addressed as an industry to prepare for export and ensure that Australian product would be received well in the market. For example, there needs to be a set of market product specification guides which determine size and quality parameters. At the moment there is variability in Australian size, and sales of size 16, which would not be accepted in global markets. Also, there is a need to develop consistent market protocols for export which defines the export quality of the fruit.

While a range of actions are presented below, the following is considered a priority action:

**PRIORITY ACTION:** Conduct market research to better understand consumer demands and different end -use opportunities, resulting in a market development plan.

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| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Development of initiatives that help growers be market ready.  | Develop workshops and training which supports pomegranate growers to be market ready in partnerships with relevant Government agencies. Develop communication material on what the domestic and international market expect from pomegranates so growers are aware of consumers expectations. MARKET RESEARCH: Review pathway for markets – domesticMARKET RESEARCH: Review pathway to market – international  | Satisfied customers who repeat purchase, and gain health and nutritional benefits.  |
| Development of market access protocols.  | Develop market access protocols which ensure Australian growers are all aware and adhering to defined product guidelines.  | Consistent product delivered nationally.  |
| Food safety compliance.  | Develop programs which help pomegranate growers establish their food safety compliance. This may include grants to help small growers establish their enterprise, recognising that there is no profit for the first 4 years of plant growth.  | Highest product safety standards. National compliance.  |
| Industry infrastructure  | Development of a biosecurity packhouse which uses cutting edge technologies to reduce the risk of fruit fly. Investigate collaborative opportunities across the supply chain and look at the NCRIS research infrastructure scheme to investigate the possibility of new biosecurity infrastructure.  | Industry infrastructure to better control fruit fly. Ensure national and international compliance.  |

## 5.1 Value Chain thinking to drive growth

The global pomegranate industry produces fresh fruit and a range of secondary products such as arils, juice, molasses, sparkling wine, stockfeed and nutraceuticals. However, the Australian domestic market predominantly supplies fresh fruit, arils and juice. Successful industry growth is dependent on an industry value chain that can collaborate to deliver a total chain surplus (profit) and therefore, provide profitability for each of the chain stages. However, there is some confusion over this supply chain, with many surveyed indicating they do not understand the full process, or how to maximise efficiency throughout the chain.

The industry has distinct regional advantages. Australia's climate and geography enables strong production and the participation in a counter-cyclical market in the Northern Hemisphere, proximity to Asian markets, clean green image, mature and efficient logistics, and access to quality systems. However, as an emerging industry, it faces a number of challenges, including:

* High production risk due to research gaps in plant varieties
* Lack of technical support for growers
* Lack of coordination across the value chain
* Increased buying power through an increase in supply from South Africa and South America

Value Chain Analysis (VCA) research undertaken by Nott, Farquharson and Griffith, (2019, p. 50) found that there were specific information gaps along the value chain linkage as noted in Table 1. The highest priority information gap is the development of a consumer profile that builds on the three distinct categories which currently underpin the consumption of pomegranates: multiculturalism, food consumption trends and health benefits. This profile would establish key demographics and identify how, when and what form and in what quantity are pomegranates and their value-added products consumed.

***Table 1: Value chain linkage, information gaps and responsibility (Nott et al 2019).***

|  |  |  |
| --- | --- | --- |
| **Value chain linkage** | **Information gaps** | **Responsibility** |
| Consumer | Consumer profile | Australian Pomegranate Association (APA) |
| Australian industry | Industry profile  | APA |
| Export | Market Access profile and prerequisites  | APA |
| Retailers / supermarkets | Product specification  | APA |
| Growing | Variety selection | Researchers/ Nursery, Growers, Retailers and Supermarkets |
| Growing | Pest and disease  | Grower, SARDI, APA |

Initial scanning of the literature, plus a review of initial survey results suggests that the following growth pillars and priority actions should be considered:

|  |  |  |
| --- | --- | --- |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Skills development  | Many surveyed indicated that they do not understand the terminology ‘value chain’ or where / how they fit. Training and education are needed.  | An informed industry |
| Consumer research  | Market research which defines the pomegranate consumer profile.  | Better understanding of consumer and market guides, so communication campaigns can be more strategic and targeted.  |
| Development of joint processing facilities  | Explore opportunities to develop state-by-state processing facilities. Develop a business case in each state considering the cost/benefit analysis. Seek support from State business building departments (i.e. cold processing).  | Collective opportunities to build market growth and delivery.  |

## 5.2. Positioning of the pomegranate as a health product

When looking for new market opportunities for Australian pomegranates, an integral part of this will be to position the product to the health-conscious consumer. There is growing awareness of the importance of consuming food containing natural bioactive ingredients, like antioxidants, to enhance and protect human health. There are growing markets for fruits high in antioxidants, such as pomegranates, and their wastes (i.e. peels and seeds) for their bioactive ingredients.

Research has found that the pomegranate fruit, flowers, bark and leaves contain bioactive phytochemicals that are antimicrobial, reduce blood pressure and are active against diseases such as diabetes and cancer (Seeram et al. 2006 cited in Ezra et al 2015). The major class of phytochemicals associated with health benefits are phenols (Seeram et al., 2006 cited in Jobling et al., 2010). The content of soluble phenols in juice can vary depending on cultivar (Furman and Aviram, 2006; Jobling et al., 2010).

Akpinar-Bayzit et al (2012) highlighted epidemiological data suggesting that the bioactive compounds found in pomegranates such as phenolic acids, flavonoids and tannins may have potential as a chemo-preventive and inhibit the process of carcinogenesis. However, they went on to highlight the need for further clinical research, particularly focussing on the development of novel pomegranate-derived products such as seeds, juice concentrates, and more traditional pomegranate products for health benefits. It is important to note the absence of Australian-based findings in this research.

It is also important to note that almost all literature identified in this scan was undertaken in an international context, with a notable absence of research relating specifically to the Australian population. This indicates a strong need for Australian-based research – including clinical trials in this area, to determine the generalisability of the international findings. It is also important to note that this literature scan did not evaluate the scholarly rigour of many of the claims, particularly those involving clinical trials. Initial scanning of the literature, plus a review of initial survey results suggests that the following growth pillars and priorities actions should be considered:

|  |  |  |
| --- | --- | --- |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Assessment of health benefits (including antioxidant levels) under different growth and storage conditions in the Australian market.  | Investing in research which assesses the health benefits of pomegranates in different growth and storage conditions to understand how this impacts potency of antioxidant levels and bioactive compounds.  | Rigorous knowledge to support marketing campaigns.  |
| Nutraceutical market research and exploitation  | Conduct a scoping study which reviews opportunities for growth of the pomegranate nutraceutical market in Australia.  | Knowledge for further investment Development of new products |
| Management of food waste.  | Development of pomegranate waste programs which look at better management of by-products i.e. use as an animal feed.  | Knowledge for further investmentDevelopment of new products |
| Knowledge to inform best practice growth and storage.  | Research to investigate how pomegranate management (on farm) through to picking and storage impacts the phenols and health quality, with clear guides issued to the value chain participants.  | Ensuring high quality, consistent product is entering the market with its nutrient profile maintained.  |

# 6.0 BIOSECURITY PREPAREDNESS

National and international biosecurity preparedness must underpin the future of the Australian pomegranate industry. The literature review and industry survey suggest that the following biosecurity priorities be actioned:

1. Given the recent approval of imported Indian pomegranates, Australia must be forward planning to manage the potential risk / impact of *Xylella fastidiosa*, an invasive bacterial plant pathogen from fruit imported from India. This will not only affect pomegranates but also viticulture, citrus and olive production. While *Xylella fastidiosa* was not identified as a quarantine pest for risk assessment, the association requested a pest risk assessment, including identification of insect vectors and border protection measures on this bacteria due to the devastating impact it would have to multiple horticultural industries if it was to ever enter the country. Despite the lack of published evidence that pomegranates are a host for *Xylella*, association members are concerned that pomegranates may harbour the disease and seek further research into the host range of *Xylella*, including establishing whether pomegranates are a host.
2. A main biosecurity risk for Australian growers is the fruit fly. Mediterranean fruit fly can damage fruit where the fruit is cracked, so growers must respond and implement a baiting program (AgriFutures 2017). Pomegranates grown in fruit fly declared regions cannot be exported, nor sent into fruit fly free areas domestically. This is a market limitation for several existing growers (RIRDC 2014), mentioned by many in the recent engagement survey. Growers in hot spots are incurring additional costs with packaging, chemical management, transport / logistics and compliance. Support is required to:
* Improve grower notification if an outbreak occurs, and what this means for their business
* Better support for growers to ensure compliance
* Financial support for growers who incur additional expenses as these costs are impacting small businesses.
1. Bacterial Blight also poses a serious threat to the Australian pomegranate industry if it was to ever enter the country. While the over-all risk is rated as low in the report, the assessment identifies the likelihood of entry, establishment and spread as moderate. The APA requested that further assessment be undertaken regarding protection against this risk. As symptoms of bacterial diseases are not always detectible, members were particularly concerned that despite the recommended risk management measures, Bacterial Blight and *Xylella* may enter undetected and become established in Australia, decimating major horticultural industries. With *Xylella* rated as Australia’s number one exotic plant pest, a zero tolerance to risk of this pathogen would be desirable.
2. Pre-export methyl bromide fumigation of pomegranate whole fruit was introduced for fruit imported into Australia from the USA this year to manage the risk of arthropod pests, suggesting that the previous pest risk management measures were not achieving appropriate levels of protection. This highlights the difficulties in achieving desired protection, even in pests which are detectable.
3. Consumers are seeking reassurance on the safety of imported food, and the food safety of the products with concerns raised over recent Hepatitis contaminations. Franklin et al (2019) conducted an enhanced human epidemiological investigation of three outbreaks of hepatitis A in Australia from imported frozen fruits - including confirmed detections in frozen pomegranate aril products. Their research strongly recommended a revision of the risk assessments of these types of imported foods when being consumed without further cooking by a susceptible population (Franklin et al 2019). While this is not traditionally biosecurity (i.e. food safety), it is being mentioned in this pillar to ensure industry has this on its radar.

**PRIORITY ACTION:** To ensure the pomegranate industry is appropriately prepared, the priority action for the BIOSECURITY PREPAREDNESS objective is: Further development of biosecurity measures including detailed risk assessments on key threats to the integrity and viability of the local, Australian industry.

Other priority actions include:

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| --- | --- | --- |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Work with biosecurity agencies to inform pomegranate biosecurity preparedness – i.e. drive research into the host range of Xyella fastidiosa.  | Development of a horticultural risk management plan for Xylella fastidiosa, an invasive bacterial plant pathogen, in case infected fruit causes an outbreak. | An industry prepared and able to respond.  |
| Review the effectiveness of fruit fly treatment options in pomegranates.  | Review the effectiveness / efficacy of control measures used to reduce the risk of potential introduced pests arriving in Australia. i.e. eradication of fruit flies via area freedom, cold treatment or irradiation. For Bacterial Blight, area freedom or a systems approach. Development of clear containment guidelines for fruit fly exclusion zones in SA. Support for management costs associated with compliance for growers in hot spot zones. | An adaptive and responsive industry.  |

# quality Icon 33244497.0 ENHANCED PRODUCT QUALITY

Industry engagement found consumers are seeking fruit of a medium to large size, which is blemish-free, glossy and red in colour and large, sweet arils and of high, consistent quality. This is consistent with the market expectations presented by Johnson (2002) in the *Pomegranate Growing* AgFacts report, which states the market is seeking fruit which is relatively blemish-free, medium to large, with plenty of red colour evident; both externally and in the juicy sub-acid pulp surrounding each seed. The report also states that seeds should be tender, and that good varieties should have a large proportion of edible pulp to ring and cell partitions, which are unpalatable and bitter (Johnson 2002).

There is no consistent quality guide for fruits in Australia. This is considered a major risk and downfall of the industry. Many believe consumers are after a consistent product in the market and that failure to set clear industry standards will impact consumers purchasing behaviour and product satisfaction. Guidelines are needed to support national and international market growth.

Looking forward, the industry reported in the APA engagement survey that they think the market in ten years will be seeking high quality varieties with clear flavour profiles (i.e. sweet vs sour), and more defined antioxidant levels with consumption guidelines (i.e. ‘how much do I need to eat daily to gain health benefits’). Many industry representatives are keen to see a more diverse range of varieties marketed to consumers, with branding similar to apples (i.e. Granny Smith, Red Delicious etc). This would profile the sweet or sour varieties, or the soft-seed varieties. They also feel there is room for the industry to better supply the market year-round with Australia frozen arils, products and fresh fruit.

The trends of Australian consumers should be considered when looking at growth and investment in the Australian pomegranate industry. Consumers are becoming more health conscious and are interested in the health benefits of pomegranate consumption and their preference for Australian product. The recent instances of imported frozen food contamination have impacted consumer confidence in imported products.

To grow the Australian pomegranate market, there needs to be better understanding of the consumer (i.e. how they view the fruit, how they use it and what would make them consume more). Market research is also required to better inform market opportunities for juicing, frozen arils, skin care products, value-added products (such as ice cream), condiments and for use in pre-prepared salads. This consumer insight is fundamental in our pathway forward with Australian pomegranates, and will further drive the value chain.

**PRIORITY ACTION:**  Better define the product specifications, fruit size in particular.

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| --- | --- | --- |
| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Market research to guide the future of growth markets.  | Market research is required to formally understand the consumer and expectations for pomegranates. Current knowledge is anecdotal.  | Knowledge to drive markets.  |
| Development of pomegranate varieties’ campaigns so the consumer is aware of sweet vs sour varieties.  | Develop a communication and marketing campaign which builds awareness of the sweet and sour pomegranate varieties and establish these in the marketplace. This will work to build sales and consumer awareness of the product, its uses and health benefits.  | Better placement and awareness of pomegranates on the market shelves.  |
| Market and consumer education campaigns.  | Development of a national education / communication campaign which promotes Australian pomegranate varieties, health benefits and characteristics (including what markings on the skin mean).  | Increased consumer knowledge and consumption of pomegranates. Increased sales. Increased utilisation of pomegranate fruit.  |
| Scoping study of market opportunities for: frozen arils, juicing, skin care, condiments etc.  | Market analysis and development of Australian frozen arils. Scoping study which reviews and identifies market pathways for juices, condiments etc.  | Increased dominance of market share with Australian product.  |
| Access to clear market insights and trends.  | Segmentation of pomegranate growth information in the next ABS agricultural commodity reports. Lobby state agriculture departments to collect data on the pomegranate industry. Work with AgriFutures to view market insights into the Pomegranate industry.  | Access to information to inform domestic and international market applications.  |
| The development of an Australian-grown pomegranate product quality criteria Specification Sheet is a high priority. | To raise the quality of all domestically grown fruit, the development of an Australian product specification within an export standard is required. The APA should work with its members to identify an existing international pomegranate Export Standard and amend it to align with the Australian conditions. This would raise the quality of the domestic production and with cool storage create a value proposition to compete with imported pomegranates through a large portion of the year. | Consistent guides to support market expectations and growth. Guide to underpin export plans.  |

# growth Icon 13516218.0 Technology

The pomegranate industry is eager to explore new opportunities for technology adoption and innovation to drive growth, productivity and efficiency. It is also seen as an important way to mechanise farm operations to reduce dependency on labour, and increase speed and efficiency of many on farm/pack house processes. The survey identified the following technology priorities:

* SPRAY: Pomegranate orchards can be sprayed with fungicides using a conventional sprayer however, there are potential gains to be made by spraying the flowers only rather than the whole tree. This is very early work and has not been tried in pomegranates and represents an opportunity to innovate.
* PROTECTED CROPPING: Further research is required to investigate new opportunities for protected cropping.
* AUTONOMOUS VEHICLES / SENSING TECHNOLOGY: Expansion of research undertaken by the Centre of Field Robotics i.e. robots that run autonomously through an orchard, with on-board sensors, coupled with AI approaches, to detect flowers, fruit buds, and the fruit itself. There is interest from the pomegranate sector in exploring intelligent spraying (as above) which targets a specific plant part i.e. foliage around fruit. (S Sukkarieh 2021, pers. comm. 26 April) or through the development of a robotic harvester (Note this would require the application of Artificial Intelligence (AI) to successfully identify, select and cut the mature fruit from the tree).
* PACKING-PROCESS: While there are a range of packing-process technologies (sanitisation, grading, sorting) available, these require a level of customisation for pomegranates. Growth opportunities exist in improving controlled-atmosphere storage options which have not been universally determined (i.e. the gaseous conditions needed to slow fruit deterioration in long-term pomegranate storage).

It is important to note that some growers are investigating new mechanical picking options themselves, and are seeking new ways to set up their trees to consider the future of mechanical picking or the needs of the seasonal picker. Thinking includes presenting the tree and fruits for ease of picking and reduces the risk of prickles scratching the picker as they navigate the fruit. However, there are no resources or information which could guide this as industry best practice.

Further research is required to explore what mechanisation and automation is possible for pomegranate harvesting given the development of robotics and the identification of mature fruit using machine learning in other similar tree crops.

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| GROWTH PILLAR  | PRIORITY ACTION  | OUTCOME  |
| Implementation of new grants to support adoption  | Development of new industry grants which support the adoption and validation of new technology into the pomegranate industry.  | Adoption of AgTech which improves productivity and efficiency.  |
| Link with state based AgTech farms to drive validation of new technology to support automated picking / spraying/  | Linkage with state-based AgTech farms which support validation of new international technology.  | Collaboration with existing farms to leverage funding and opportunities. |
| Adoption of automation and technology, such as mechanical harvesting  | Conduct a national and international scoping study which introduces new picking options to Australia. Form links with State AgTech sites to review implementation and validation of technology into the Australian climate.  | Farmers mechanising their business for an efficient and productive enterprise and industry.  |
| Development or new fruit quality automation options to scan fruit quality.  | Development of new fruit quality scanning machines which can be used to detect fruit fly or black heart. These must also assess size and overall quality. NOTE: This technology exists for many existing packing lines. There is a pomegranate package available for at least one brand. . | Consistent, quality fruit entering the marketplace.  |
| Investment in automated spraying and spray innovations  | Development of precision sprayer which can spray the flowers only. This would improve spray efficiency.  | Cost savings and efficiencies.  |

# help Icon 27257879.0 INDUSTRY ADVOCACY

The delivery of this plan will be coordinated through the APA. As such, it is fundamental that this group is supported to act, and advocate, on behalf of pomegranate growers.

As with lots of emerging industries there are limited players, one or two dominant players and a lot of potential new entrants seeking the opportunity to grow the industry which may pose a threat to the incumbents. The industry governance arrangement must be clear, inherent conflicts of interest must be recognised and managed and the growth aspirations for the whole industry are well articulated. The engagement survey found that industry is expecting the APA to:

* Be the voice of Australian pomegranate growers.
* Offer training to help build industry capacity i.e. sharing research knowledge to advisers / agronomists etc so there is a network of leaders in Australia which support growers.
* Increase communication outputs so stakeholders are informed and aware of new knowledge, resources and opportunities. And
* Support the industry through new skills training, leadership, governance and planning.

Considering this, the following action is a priority: *Build the profile of the APA so it can continue to be the voice of Australian pomegranate growers, and increase communication outputs so stakeholders are informed and aware of new knowledge, resources and opportunities. Support the industry through new skills training, leadership, governance and planning.*

To underpin the growth and functioning of the APA, the following actions have been identified.

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| --- | --- | --- |
| **GROWTH PILLAR**  | **PRIORITY ACTION**  | **OUTCOME**  |
| Succession planning to support the future of the pomegranate industry.  | Development of an industry succession plan which includes the identification and training of pomegranate industry representatives and agronomists.  | Trained agronomists who can support industry.  |
| The APA provides the industry with relevant research, information and knowledge.  | The APA delivers knowledge to the pomegranate industry through timely communication outputs (i.e. newsletters, website updates etc).  | The pomegranate industry utilises the APA as its key source of industry information.  |
| Manage the implementation of the plan.  | Work with AgriFutures to ensure investments align to the plan.  | Through the APA, the plan will be adopted, managed and implemented. |

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