

# Growing Protected Cropping in Australia to 2030

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**Submission**

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## 1. OVERVIEW

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### 1.1 Our vision

The protected cropping industry is one of the fastest growing sectors in Australian agriculture – and it is clear there is still potential for significant growth.

Managed correctly, the industry will contribute to national food security. It will also enable farmers to diversify their business models to reflect changing climatic systems and improve resilience – which in turn will improve business profitability.

If this can be achieved, the protected cropping industry will make a significant contribution to delivering on the federal government’s target of growing agriculture to \$100 billion by 2030.

**Our vision is that, by 2030, the Australian protected cropping industry:**

- **is growing sustainably across triple bottom line measures**
- **has addressed factors limiting growth**
- **is well understood and supported by stakeholders**
- **is recognised as a reliable supplier of premium quality products which are in demand by domestic and global consumers**

### 1.2 About PCA

Protected Cropping Australia (PCA) is the peak industry body representing commercial hydroponic and greenhouse growers Australia wide. PCA members also include equipment and installation suppliers, specialist consultants and advisors, researchers and educators.

PCA is committed to improving the business environment in which growers operate, through the value chain and the regulatory environment, and by providing pathways to practical outcomes for members, including continuous improvement in horticultural production systems, marketing and business. In return, PCA expects that growers will be able to operate in a reasonable business environment, with opportunity for fair competition and equitable sharing of risk. We also expect that other stakeholders involved with the industry will consider the industry’s costs of production when making decisions affecting growers.

## 2. INDUSTRY BACKGROUND

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### 2.1 Horticulture in Australia

The commercial fruit and vegetable growing industry is highly competitive, made up of small, medium and large enterprises operating with a range of business models and markets.

The industry is driven by market forces, rather than being regulated by quotas or licenses. Growers expect that they will be able to operate in a reasonable business environment, with opportunity for fair competition.

A number of reviews of the horticulture industry have provided insight into the factors impacting on horticulture business management and development.

These factors include:

- Retailers having enormous power down the chain as they strive to secure the consumer dollar, which is driving the structure and nature of produce
- A greater focus on the use of sophisticated technologies across the chain to provide improved outcomes
- A greater focus on the domestic market, which is often oversupplied, has many producers, has ineffective communication, is strongly competitive, and lacks price transparency.

Overall, the changing nature of the horticulture industry continues to have an impact on business management and development, as well as on industry productivity and growth.

This is further being influenced by factors such as the investment requirements, biosecurity issues, availability of labour, management of human resources, the value chain, international competitiveness, natural resource management, and climate variability. These issues are placing enormous change pressures on the industry.

## 2.2 What is protected cropping?

Protected cropping is defined as the production of horticultural crops within, under, or sheltered by artificial structures to provide or enable modified growing conditions, and protection from pests and adverse weather. Crops are often grown in artificial media rather than directly in the soil, and nutrients are supplied through irrigation systems.

Protected cropping is about control and technology is largely focussed on increasing that control. The level of technology - and hence control - in protected cropping varies and is broadly divided into three categories.

At the high-tech end of the industry, this amounts to almost total control over the plants growing environment, from the root zone through to the atmosphere. The level of control, particularly of the atmosphere, decreases for medium- and low-tech protected cropping structures.

By way of explanation,

- **Low technology** protected cropping consists of netting and polytunnels which are open at each end. Whilst these systems are without any automation or control, the mere act of enclosing some aspect of the crop production system results in changing micro-environments and hence agronomy requirements.
- **Medium technology** protected cropping consists of enclosed polyhouses for which the sides can be opened and closed, allowing some degree of control of temperature and humidity. Polyhouses are usually constructed of a galvanised steel frame with either a single or double layer of polyethylene and can be up to 4.5 metres in height.
- **High technology** protected cropping consists of constructed glasshouses which can be up to 8.5m high with significant automation of vents, fans, heaters and shade to optimise growing conditions. They have hydroponic systems that are computer controlled and automated. Sowing, crop management and picking are also partially or fully automated.

## 2.3 Protected cropping in Australia

The development of protected cropping in Australia has lagged much of the world due to our wide range of growing environments and ability to grow “out-of-season” vegetables under field conditions.

In terms of actual controlled environments, the first stage was moving to low technology plastic film-based structures. The conversion from soil to hydroponics in protective cropping was the next major “upgrade” in many areas.

This was driven by the prevalence of soilborne diseases and poor soil condition under the intensively cropped protective structures. Climate control technology initially involved ventilation and cooling, with naturally ventilated structures and fogging, proving to be very effective in modifying the high temperatures experienced in many regions.

Significant crops include:

- Nursery and floriculture, including nursery stock, floriculture, cut flowers, and other ornamental crops.
- Fruit and vegetables, including fruits or vegetables such as cucumbers, tomatoes, eggplants, and capsicum.
- Leafy greens, including lettuce, herbs, microgreens and Asian greens.
- Berries, including strawberries, blueberries, bramble or cane berries (*Rubus spp*), and currants (*Ribes spp*).
- Herbs, including any plant with leaves, seeds, or flowers which is used for flavouring, food, medicine, or perfume but which does not have significant human food nutrition value.
- Cannabis, including protected cropping or hydroponic production of medicinal cannabis and hemp products.
- Aquaponics, including the hydroponic production of any plant in a system whereby the waste produced by farmed fish or other aquatic creatures supplies part of a nutrient profile for plants.

Recent industry expansion has largely been based on development of high technology protected cropping structures to meet specific market requirements for high volume contracts and quality measures for key fresh product lines such as tomatoes, cucumbers and berries.

There has also been increasing movement in high value crops from open-ground production to netted cropping. Examples include cherries and berries.

## 2.4 Value of the industry

The protected cropping industry is a very large and diverse sector within the Australian horticulture sector industry, with a significant but varied presence in most states. There are few reliable up-to-date figures on the national profile of the industry, so the details provided here are an educated guess only.

Protected cropping is the fastest growing food-producing sector in Australia, with annual growth rates averaging more than 60% over the past five years.

In 2017, it was valued at around \$1.5 billion (\$1,589 million) per annum at the farm gate, up from \$486 million in 2014. This is equivalent to around 15% of the total value of vegetable and cut flower production in Australia (RIRDC report HSA-9A).

There is also extensive production of non-food crops in protected cropping environments. This includes nursery and cut flowers, medicinal cannabis and various crops for oils or nutraceutical products.

Anecdotally, it is understood that around 30% of all Australian farmers now grow crops in some form of soil-less or protected cropping system.

## 2.5 Employment in the industry

Despite the high levels of automation in more sophisticated glasshouse environments, large-scale protected cropping requires a significant labour force, especially during crop establishment and harvest.

Research carried out overseas estimates that the annual work requirement is 11,293 hours per hectare of high-tech structure (which does not include packing operations or any other activities outside of the greenhouse). Assuming an average worker works 1,610 hours per year, then some 7 workers would be required per hectare of operation.

Much of the labour force requirement is semi- or unskilled and many of the work operations can be repetitive. For example, in a tomato greenhouse plants need to be regularly de-leafed, flowers need to be pollinated by hand and fruit needs to be picked.

Whilst the most modern facilities use automation to facilitate many of these tasks, the bulk of the work still must be performed by people. At the other end of the spectrum, demand for highly skilled growers who manage these large facilities is high and supply of people with suitable skills is low.

The fact that produce is grown all year round in protected cropping systems means that there is less seasonality in the workforce requirements and the physical conditions are less taxing than for field-grown crops. This means many new facilities can source labour locally and, even where seasonal worker labour is employed, often develop long-term relationships with workers and communities.

It is estimated that more than 10,000 people are currently employed directly in protected cropping throughout Australia, with labour requirements for the industry expanding at more than 5% per annum.

## 2.6 Investment in the industry

Protected cropping structures are capital intensive, with a high level of supporting infrastructure required.

The key advantage of protected cropping is the ability to control the growing environment. This brings with it the ability to optimise climate conditions and plant properties to deliver improved productivity and profitability. For example, in the Netherlands over the last 25 years productivity (kg per m<sup>2</sup> of glasshouse) has increased by 90% for sweet peppers and 35% for cucumbers.

Capital costs can be anywhere between \$250 and \$750 plus per square metre, depending on the sophistication of the facility and the level of equipment being included. Viable production units are a minimum of 1,500 square metres.

The average return on investment is between 5% and 10%. The potential return on investment for high technology glasshouse vegetable enterprises can be as high as 20-25% per annum.

Whilst growing crops under cover may be more energy and capital intensive than some other farming methods, the ability to increase food security, mitigate weather impacts and minimise environmental impacts are key drivers for investors.

Add to these benefits the ability to ensure traceability and to deliver consistent quality outcomes, and the advantages of controlled environment production far outweigh the up-front investment required.

Protected cropping production systems are also very efficient users of water. Open ground fruit and vegetable production generally uses about 38L of water per dollar of value produced, whereas hydroponically-produced vegetable crops use only 0.6L of water to produce the same value.

This is also attracting investors interested in ensuring food security and minimising the overall environmental footprint. State of the art control systems in high-tech developments means new facilities have a relatively small environmental impact.

For example, nutrient loads and run-off are managed on-farm or in closed, recycling systems.

Controlled environment production systems also ensure, consistency in both quantity and quality of outputs, which in turn means less food waste.

### **3. GROWING THE INDUSTRY**

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#### **3.1 Barriers to growth**

In 2019, Senator Richard Colbeck (then Assistant Minister for Agriculture) convened a roundtable forum to look the development of a 2030 strategy for the protected cropping industry. The meeting was attended by key stakeholders from across the value chain.

These issues were identified by workshop participants as being likely to have the greatest influence on the future of the industry going forward:

- Economics
- Leadership
- Skills development
- Planning
- Biosecurity and market access

#### **Economics**

One of the major issues affecting the protected cropping sector is the fact that there is so little objective information available – either to existing industry participants or to potential new entrants.

So, in the short term, the highest priority for the protected cropping industry is the development of a comprehensive picture of the industry from shed and shelf to consumer. By that, we mean the sort of industry profile information that is readily available for traditional agriculture industries. This will provide benchmarks for assessment of future industry performance, as well as a tool to improve wider understanding of the sector.

For the high technology production facilities, there is a strong reliance on expertise from northern Europe, and north America. This also applies to much of the research and development that occurs in the engineering and technology areas.

Because the leading edge of the protected cropping industry is technology-driven, there will always be new developments that can have a positive impact upon production efficiency and hence returns to growers.

Whilst we have traditionally ‘borrowed’ technology from overseas, these resources can only be effectively leveraged when adapted to Australian conditions. That requires a targeted research and development program.

Crops grown in controlled environments span many industry sectors which have R&D levies.

However, there is no mechanism for PCA to be engaged in investment decisions within each of the relevant R&D levy processes. This means that it is rare for projects to be approved and, where funding is allocated, it is often to things not considered to be a high priority by protected cropping growers.

### **Leadership**

In agriculture, we are spoilt for choice when it comes to leadership development and capacity building programs.

However, where these existing programs fail is in the follow through.

Too often these opportunities are characterised by an intensive, immersive experience and then nothing. This leaves young people equipped with new skills and knowledge but no clear pathway to deploy their skills.

Young leaders need ongoing support from mentors, champions and coaches to navigate career and volunteer commitments and identify where to invest their energy. Industry also needs to be flexible and cater to fluctuating demands of work, study, and family.

Over time, people in the industry need to add new skills, so we must foster an environment where everyone has ongoing opportunities to fill skills gaps. This could include invitations to sit on industry committees or boards, opportunities to participate in events, speak at conferences, participate in think tanks and shadow current industry leaders. This, and actively offering opportunities to 're-engage', help keep those in the industry connected in the long term and prepared to make a contribution to the industry in which they work.

There is a distinct lack of initiatives which successfully tie everything together like this. With the diverse nature of crops grown and the wide scope of skill levels required, the protected cropping sector is well-placed to develop a more holistic approach to stakeholder engagement.

### **Skills development**

The face of agriculture is changing – rapidly – and global imperatives for new ways to produce food and care for the environment in which it is grown mean that the agricultural sector will be almost unrecognisable in years to come. As agriculture becomes more high-tech, alongside more traditional roles there is a need for a differently and highly skilled workforce and new ways of supporting and resourcing that workforce.

The protected cropping industry has the potential to be an economic driver with respect to the production of highly valued agri-food products destined for commodity and niche markets. If this potential is to be achieved, novel and attractive career pathways need to be established and communicated to attract the workforce required to fulfil this potential.

Already, demand for highly skilled technicians is outstripping supply and there is little structured training for new entrants into the protected cropping industry. This means there is a strong reliance on overseas workers – but these too are in short supply.

A detailed analysis of the skill and knowledge requirements in the sector is key to future growth in this sector. Once this has been done, PCA can work with the wider industry, governments, education and training providers to address the issues identified and to better understand what actions need to be taken, and by who, to support the growth of high skilled and high valued agriculture workforce. This will also assist in informing current and future job seekers on the consequent employment and career opportunities.

### **Land use planning**

One of the key challenges facing the industry relates to community concern about the perceived visual impacts of large structures.



Protected cropping businesses have high labour requirements, reliance on specialist service and ancillary industries and fragile and perishable crops. These facilities are, generally, best suited to peri-urban locations. This can result in increased potential for land use conflict with neighbours who see the large structures as not compatible with their lifestyle expectations. These areas are also less familiar with agricultural production, and this causes issues with local government authorities that have little experience in these types of development.

To be successful, as for all agriculture, the protected cropping sector must have certainty of land tenure.

Effective land use planning is therefore crucial to protecting the sector's capacity to underpin economic activity and deliver desired outcomes for local communities – and the nation more broadly. Key drivers of success will therefore include a supportive regulatory framework with innovative approaches to land use planning, and an understanding of the extent of current and projected future agricultural land resources.

### **Biosecurity and market access**

The diversity of crops grown in controlled environment systems to some extent minimises risks from both biosecurity threats and market fluctuations. However, on the other hand, this diversity also results in increased risks in an environment which is primarily commodity-driven.

Biosecurity threats are exacerbated by the fact that the sector is not generally consulted or involved in preparedness and response activities which are undertaken by commodity groups and based on open-ground production systems. The same can be said of most market access and in-market promotions programs.

There is obvious potential for growth in the domestic market. However, there are also clear opportunities for significant export market growth. If these opportunities are to be addressed, the protected cropping sector needs to have a higher profile in decision-making processes.

## **3.2 Perspective determines priorities**

These concerns were reflected in differing degrees across the spectrum of stakeholder groups engaged in this conversation.

From a **grower/value chain** perspective, these issues were identified as key:

- Skills aligned to industry needs for growers, specialist technical staff, and harvest labour
- Access to capital and mapping capital investment required at all stages of the value chain
- Social license - especially around visual impact and environmental impact
- Planning and building regulation, both for development of new facilities and expansion/update of existing ones. The lack of consistency across local government areas exacerbates these challenges.
- Lack of awareness and understanding of the industry by others including government, councils, banks etc – all focus seems to be on more traditional types of agriculture
- Pollination environment differs and creates hurdles
- No clear alignment between research and industry needs because of the commodity focus of research funding
- Increasing energy costs
- Higher production costs mean that growers need higher returns
- Improved biosecurity risk management and market access

From a **researcher** perspective, these issues were identified as key:

- Ensuring R&D is focused on key research priorities
- Capacity building - training and funding
- Offsite impacts, including green waste and non-green waste eg plastics, coir, substrate
- Community acceptance and the need for social research to better understand factors affecting the industry
- Resource use efficiency - including water, energy, chemicals
- Facilities - site selection, design and construction
- Benefits of protected cropping in terms of environmental impact, climate change resilience and risk minimisation
- Economics
  - Market impact
  - Supply efficiency
  - Benefit cost analyses and ROI analyses
  - Equipment redundancy
  - Robotics/labour saving
  - Enabling technology and connectivity
  - QA benefits/ traceability
  - Consumer benefits – shelf life, nutrition, health benefits etc
- Technology transfer – decision support
- Participatory R&D
- Investment to support early adopters
- Importance of data sharing via open access to intellectual property
- Biosecurity – industry certainty and market access benefits

**Government** representatives at the round table identified these issues as key:

- Planning approvals and building construction regulations
- Energy
- Market access
- Labour supply
- Education and training
- Taxation
- Government role in research

To ensure future success, it is clear the constraints hampering industry sustainability must be addressed through a strategic whole-of-government approach. This must be developed in partnership with industry, and it must address the issues which have been identified as either enablers or constraints.

### **3.3 Strategic imperatives**

In 2007, an industry planning workshop convened as part of the vegetable industry strategic planning process identified a number of issues impacting on growth of the protected cropping sector.

Comparison of these issues with the issues identified at the 2019 Colbeck workshop (as outlined above), showed a marked consistency, across all growing sectors.

This indicates little progress has been made in the past decade to address the factors that are negatively impacting on further growth of the protected cropping.

In summary, these are considered to be the key areas on which the industry needs to focus:

- Understanding industry structure and economics
- Growing the market for quality products grown using protected cropping systems
- Increasing industry productivity and profitability
- Strengthening industry information and communication capacity and networks
- Identifying and building industry skills needs and leadership capacity.

Further unpacking of these issues identified steps that will need to be taken if potential is to be achieved. These are set out in Table 1 below.

**Table 1: Strategic framework for facilitating growth of the protected cropping industry**

1. Understanding industry structure and economics	2. Growing the market for quality products	3. Increasing industry productivity and profitability	4. Strengthening industry information & communication capacity and networks	5. Identifying and building industry skills needs and leadership capacity
1.1 Develop industry profile statement, including benchmark information and verified data 1.2 Understand future trends that will impact on the industry 1.3 Develop funding mechanisms that will facilitate industry-level investment in addressing identified imperatives	2.1 Better understand customers and their needs 2.2 Develop products aligned with priority market segments 2.3 Market and promote products grown in protected cropping systems	3.1 Manage R&D priorities to build more resilient businesses 3.2 Address biosecurity and market access issues 3.3 Enhance triple bottom line sustainability 3.4 Improve through-chain productivity 3.5 Develop consistent national approaches to land-use planning and building/construction codes 3.6 Reduce adverse impacts of other regulations on industry	4.1 Establish quality industry information systems 4.2 Develop adequate processes for extension and technology transfer 4.3 Improve communication across the supply chain 4.4 Encourage the use of improved communications technologies	5.1 Better understand current and future industry skills needs 5.2 Improve industry leadership and representation 5.3 Improve leadership and management capability in business entities 5.4 Develop pathways for training and development at all levels

## 4. TOWARDS 2030

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### 4.1 Our vision

It is clear the protected cropping industry has much potential for growth. Managed correctly, the industry will contribute to national food security. It will also enable farmers to diversify their business models to reflect changing climatic systems and improve resilience – which in turn will improve business profitability.



### 4.2 What success looks like

In the short term, the highest priority for the protected cropping industry is the development of a comprehensive picture of the industry from shed and shelf to consumer. This will provide benchmarks for assessment of future industry performance, as well as a tool to improve wider understanding of the sector. By that, we mean the sort of industry profile information that is readily available for traditional agriculture industries.

It should include:

- what is being grown where and on what scale
- production systems and investment profiles
- sectoral needs and gap analysis across major input factors (labour, infrastructure, skills and training, market access, production research, diversification opportunities, energy and water needs etc)
- historical trends and future forecasts
- potential for industry to contribute to increased food security, reduced environmental impacts etc
- potential for industry to contribute to resilient rural communities, continued economic growth and increasing employment opportunities
- metrics and targets.

In the medium term, the desired outcomes include:

- A respectful and pro-active partnership approach to industry development
- Transparent alignment of government investment and policy decisions with the strategy, and clearly articulated measures to assess progress, which are reviewed and updated at least annually
- All proposed government decisions which impact on the sector should be subject to a transparent and specific impact risk assessment process
- Appropriate and adequate funding needs to be made available to assist in adjustment to changed policy settings.

Measures of success in the medium to long term would include:

- Increased value of production
- Increased triple bottom line sustainability for individual business operations
- Increased attractiveness of the sector as an investment destination
- Increased number of protected cropping business operations and participants
- Valued and respectful partnerships between the protected cropping industry and government.

### **4.3 Our expectations**

Whilst the government's aim of growing agriculture to \$100 billion by 2030 target is a laudable aim, achieving an arbitrary dollar value of production is only part of the story. In our view, the ultimate measure of success of this strategy should be the profitability and sustainability for the sector as a whole, as well as improved results for the individual businesses involved in the sector.

Profitable businesses create more jobs, which generate economic growth in local communities. It is jobs that drive and underpin sustainable community development. Profitable businesses are better able to invest in growth and innovation. They are also more resilient in the face of business downturns, market variability and natural disasters.

PCA believes that new initiatives or changes to policy should enhance the industry's contribution to the economy and lead to greater productivity and industry sustainability. We also believe that initiatives or regulatory changes need to be transparent and well-managed and lead to outcomes such as increased investment, growth and new jobs.

The ongoing relationship between industry and government will be a key component in the success and long-term viability of the agriculture industry in general – and the protected cropping sector more specifically.

We expect:

- a consultative government that recognises PCA as the peak body for the protected cropping industry and engages with us on issues that affect the sector and our members;
- accountability and transparency in regulatory and administrative processes and a commitment to undertaking credible regulatory impact statements when considering policy change; and
- increased accessibility to forums and consultative processes to ensure meaningful and genuine engagement between government and industry.

## 5. THE WAY FORWARD

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In the future, protected cropping will play an increasingly important role in securing food supplies. These systems enable responding to the effects of climate variability by maximising both input use efficiency and quality consistency and output. They also have a smaller environmental footprint than many other forms of production.

As a result, protected cropping is one of the fastest growing sectors in Australian agriculture. Furthermore, it has the potential to contribute strongly to the target of growing Australian agriculture to a gross value of production of \$100 billion by 2030.

However, this potential will only be reached if we have a detailed understanding of trends and drivers for the sector.

The first step in achieving this understanding is the recognition that the protected cropping sector is unique amongst agricultural production sectors. This means that protected cropping growers (through their representative body, PCA) must have a seat at any table where there are discussions of industry development policies and activities.

This will require strong, co-operative partnerships between governments and industry.

We look forward to working closely with government as this strategy is developed, and subsequently implemented, through processes that support clear and accountable engagement between industry and government in future decision-making.



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