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Submission to the
**House of Representatives Standing
Committee on Primary Industries and
Resources**
on the
**Inquiry into Australian farmers and
climate change**

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Executive Summary

The Queensland horticulture industry is the largest supplier of fresh fruit and vegetables to Australian consumers, and is also the mainstay of many regional communities. Our state's producers contribute almost \$2 billion to the economy every year.

Climate change has been identified as a priority issue for the horticulture industry as it has a direct effect on the ability of growers to produce food. Horticultural products are particularly susceptible to changing climatic conditions, particularly changes in temperature and the availability of sufficient irrigation water. This susceptibility is higher than many other sectors of the agricultural industry and the wider economy.

Growcom has stressed the need for the horticulture industry to be considered separately from other agricultural industries in relation to both mitigation and adaptation strategies. Emissions from horticulture are a very small proportion (about 1%) of the emissions from the agricultural sector. There are also substantial differences among agricultural industries in their capacities to adapt to climatic challenges and to absorb the financial impacts of new policies.

Horticulture growers require the knowledge and tools that will allow them to adapt successfully to a changing climate. Further information is required to allow growers to make effective business management decisions and responses to ensure industry viability and consumers' ongoing access to locally grown, fresh fruit and vegetables.

Potential adaptation strategies for horticulture include the development and introduction of new plant varieties, shifting growing seasons, moving to new regions, and employing new technology to minimise the effects of higher temperatures, water shortages and extreme weather events. For mitigation of on-farm emissions, growers will need to invest in new management tools to improve efficiency in the use of energy and fertiliser. These strategies will have unavoidable impacts on farm productivity and profitability. The development and refinement of these strategies will require increased government investment in research and development.

Ongoing successful industry and government programs are vital in assisting growers and their communities to adapt to a changing climate. Investment is required in water use efficiency programs, biosecurity, soil health, incentive programs, workforce initiatives and infrastructure projects (water and transport). Industry risk management programs, such as Growcom's Farm Management Systems, also need to be explored as an effective method of managing business risks, raising awareness and prioritising response actions.

Growcom is also supportive of the submission provided by the Horticulture Australia Council (HAC) and Horticulture Australia Limited (HAL).

Growcom submission on the Inquiry into Australian farmers and climate change

Growcom welcomes this opportunity to provide feedback to the House of Representatives Standing Committee on Primary Industries and Resources' Inquiry into Australian farmers and climate change. The feedback provided throughout this submission is derived from our climate change work undertaken over the past two years.

Climate-related issues have been identified as a priority issue for the horticulture industry as they have a direct effect on the ability of growers to produce food. Although our producers are amongst the best in the world when it comes to managing climate variability in the everyday running of their businesses, there are uncertainties and risks beyond their current knowledge and experience for which they require assistance.

It is particularly important that governments recognise the significant differences among industries within the agriculture sector regarding climate change issues. As our submission will respond to the Committee's terms of reference and focus on the Queensland horticulture industry, we anticipate that the horticulture industry will be considered separately to other agricultural industries throughout this inquiry.

Growcom is also supportive of the submission provided by the Horticulture Australia Council (HAC) and Horticulture Australia Limited (HAL).

1. About Growcom

Growcom is the peak representative body for the Queensland production horticulture industry, providing a range of advocacy, research and industry development services to the sector. We are the only organisation in Australia to deliver services across the entire horticulture industry to businesses and organisations of all commodities, sizes and regions, as well as to associated industries in the supply chain. We are constantly in contact with growers and other horticultural business operators. As a result, we are well aware of the outlook, expectations and practical needs of our industry.

The organisation was established in 1923 as a statutory body to represent and provide services to the fruit and vegetable growing industry. As a voluntary organisation since 2003, Growcom now has grower members throughout the state and works alongside other industry organisations, regional producer associations and corporate members. To provide services and networks to growers, Growcom has approximately fifty staff located in offices in Brisbane, Bundaberg, Ayr, Toowoomba and Tully. Growcom is a member of a number of state and national industry organisations and uses these networks to promote our members' interests and to work on issues of common interest.

1.1 Growcom's experience and knowledge in climate change issues

Over the last two years, Growcom has significantly increased its capacity as a horticulture industry leader on the issues of climate change and emissions trading. A dedicated climate change officer was employed to undertake research, and contribute to the development of the Queensland Horticulture Climate Change Response Strategy, Growcom Climate Change Action Plan and climate change policies. The organisation was also a key contributor to the Queensland Farmers' Federation (QFF) climate change project funded by the Department of Agriculture, Fisheries and Forestry (DAFF).

Work that Growcom is currently engaged in or has completed includes:

- Analysis and interpretation of key literature relating to climate change and horticulture undertaken during the QFF climate change project which significantly enhanced Growcom's capacity in this area;
- Development and roll out of a carbon footprinting tool to measure emissions from horticultural enterprises;
- Submissions on the Carbon Pollution Reduction Scheme (CPRS), Garnaut review and the Senate Inquiry into climate change and the Australian agriculture sector;
- Large scale project with the Queensland Department of Primary Industries and Fisheries (QDPI&F) funded by HAL investigating the impact of projected temperature increases on key horticultural commodities;
- Research conducted for the HAL Vegetable Industry Carbon Footprint Workshop project;
- Workshops, presentations and factsheets to inform growers on climate change issues.

2. Queensland horticulture industry

Queensland is Australia's premier state for fruit and vegetable production, growing one-third of the nation's produce. Horticulture is Queensland's second largest primary industry, worth almost \$2 billion per annum and employing around 25,000 people. Our 2,800 farms produce more than 120 types of fruit and vegetables and are located from Stanthorpe in the south to the Atherton Tablelands in the far north. The state is responsible for the majority of Australia's banana, pineapple, mandarin, avocado, beetroot, capsicum and mango production. There are 16 defined horticultural regions with a total area under fruit and vegetable production of approximately 100,000 hectares.

The Queensland horticulture industry is:

- A major contributor to regional economies and the mainstay of many regional communities;
- The largest high quality supplier of fresh fruit and vegetables to Australian consumers;
- A diverse industry utilising a range of production methods in different locations and climates;
- A resource base for significant value adding throughout the food, transport, wholesale and retail industries;
- The most labour intensive of all agricultural industries, with labour representing as much as 50% of the overall operating costs;
- An industry with significant links to the tourism industry, providing income for thousands of backpackers and "grey nomads" each year;
- A high value and efficient user of water resources in terms of food production;
- A primary and secondary source of income for many families in regional Queensland e.g. through seasonal work in packing sheds; and
- The site for a number of emerging agricultural industries including olives, Asian exotic tropical fruits, culinary herbs, bush and functional foods and nutraceuticals.

Horticultural products are particularly susceptible to changing climatic conditions, more so than other sectors with the agricultural industry. Most horticultural crops have specific temperature requirements for optimum yield and quality. Global climate change will result in altered temperature regimes in growing regions and this will have direct impacts

on cropping systems and horticultural businesses. Horticulture is also reliant on access to sufficient water supplies for irrigation as 95% of the industry utilises irrigation.

As a result, the Queensland horticulture industry requires particular attention throughout this inquiry to ensure producers are able to adapt to the impacts of climate change on their businesses. The issue of food security also highlights the importance of ensuring Queensland fruit and vegetable growers have the knowledge and tools to adapt to a changing climate. Further information is required to allow growers to make effective business management decisions and responses to ensure industry viability and consumers ongoing access to locally grown, fresh fruit and vegetables.

3. Key overarching issues for the horticulture industry

There are a few key issues that Growcom believes needs to be taken into consideration by the Committee throughout this inquiry. These include:

- *Critical horticulture industry viability factors:* The viability of the industry is reliant on access to sufficient irrigation supplies at the time it is required. Climate changes that cause significant reductions in the amount of water that can be harvested/stored would have major implications for horticultural production. Unlike many other forms of agriculture, horticultural crops are also highly temperature sensitive. Temperature changes, particularly in minimum temperatures, could alter growing regions and cropping times, with some crops no longer able to be grown in Queensland at all. As a result, the horticulture industry is particularly susceptible to climate change impacts, more so than many other sectors of the economy.
- *Lack of information, research, modelling and analysis:* A major barrier to the identification of likely climate changes and the development of industry and government responses is a lack of information, research, modelling and analysis specifically focused on the implications of climate change on the horticulture industry, especially on a regional scale. Analysis of climate-related economic, industry, and environmental issues specific to the horticulture industry is essential to underpin government's development of appropriate and well-designed policies and instruments. This information and analysis will also form the basis for industry adaptation and mitigation strategies.
- *Lack of distinction made within the agricultural industry:* Growcom is keen to ensure governments recognise the significant differences among industries within the agriculture sector. There are significant variations across pastoral, broadacre cropping, intensive livestock and intensive cropping industries regarding carbon emissions, carbon offset and trading opportunities and potential climate change impacts, mitigation and adaptation strategies. For example, the horticulture industry contributes only about 1% of the emissions from the agriculture sector. Horticulture's cost profile is very different from other industries, consisting mostly of energy inputs and labour. These differences need to be understood and acknowledged in order to develop and implement effective government and industry policies and strategies. A one-size-fits-all approach to policy is inappropriate given the high degree of variation within the agricultural sector. We strongly recommend that individual industries be considered independently in the development of climate change policy, including the CPRS.

- *Impact of policy decisions:* International, national and state level policy settings will have significant implications for the horticulture industry and, if not carefully designed, could cause greater impacts on industry than the bio-physical and economic consequences of climate change itself. This is highly likely if all agricultural industries are considered together without recognition of their individual characteristics.
- *Funding and resource barriers of industry organisations:* Growcom believes that industry self management should be encouraged by governments and that industry organisations should be given the responsibility and resources to work directly with their members on tackling climate change issues. Industry groups are best placed to design programs that work with the business, market and regulatory needs of producers. Past experiences have demonstrated that this has a higher success rate of achieving both industry and government goals and objectives than government departments undertaking the initiatives themselves. Growcom has already demonstrated its capacity to work with growers on climate change issues and is best placed to continue this delivery.
- *Knowledge gaps on climate-related issues:* There are significant knowledge gaps within many issues related to climate change and horticulture, including details of the CPRS, carbon market, carbon footprinting and soil carbon sequestration. Increased research is required to investigate the potential market implications and opportunities for the horticulture industry. This is a major barrier that will need to be overcome in encouraging the adoption of farming practices which promote industry resilience to climate change impacts.
- *Communication within the industry:* Horticulture producers will require an understanding and access to accurate and relevant information on projected climate changes, likely impacts, suitable adaptation strategies and policy implications to make optimal decisions affecting the sustainability and profitability of their businesses.

4. Impacts of climate change on the horticulture industry

Climate changes could affect horticultural industries in both positive and negative ways. However, horticulture is more sensitive than many other agricultural industries to climate changes, particularly changes to temperature. The impacts of climate change will also vary among production regions.

It is predicted that annual average temperature in Queensland's coastal areas will increase by about 0.9 degrees by 2030, while inland areas will increase by about 1.1 degrees over the same period. The increase in average temperatures will occur mostly through more hot days and fewer cool nights. Rainfall events are likely to be heavier but concentrated into a shorter wet season. There are also likely to be more frequent and extreme weather events such as cyclones and droughts.

4.1 Direct impacts of climate change

The impacts of climate change on the horticulture industry will vary significantly amongst commodities and regional areas/climates, and are predicated to include impacts on:

- *Irrigation water availability and demand:* The viability of the horticulture industry is reliant on access to sufficient irrigation supplies (95% of horticulture production in Queensland is irrigated). Climate change impacts could include reduced water supply security due to changes in water harvesting and storages opportunities at farm and catchment scales. Increased crop water needs could also result from decreased soil moisture and increased evaporation.
- *Biosecurity:* In warmer environments a number of pests and diseases may be active for longer periods of the year, change their predicted behaviours or extend or shift their geographical range. For example, Queensland fruit fly could extend its natural range further south into areas where there is currently low pest pressure. The efficacy of some chemical control methods may also be reduced. Overall, climate change is likely to lead to increased pest management and biosecurity challenges.
- *Production regions and cropping cycles:* As horticulture is particularly sensitive to changes in temperature and is reliant on sufficient irrigation supplies, any changes affecting temperature or water availability may alter growing regions and cropping times. This could also lead to changes in the optimum locations for fruit and vegetable industries, and some crops (such as some varieties of apples) may no longer be able to be grown in Queensland at all. Changes in plant growth, productivity and growing seasons are also predicted.
- *Crop losses:* Greater crop damage and losses due to frosts, heat stress, fruit drop, sunburn and extreme weather events. Other predicated changes include reduced product quality, changes to pollination and reductions in the period that certain fruit crops can be "stored" on the tree and retain acceptable quality, as a result of warmer temperatures.
- *Market opportunities:* Shifts in seasons and rates of maturation could alter growers' ability to meet contractual requirements of supply or time production to hit the market windows that underpin the profitability of their crops. The international competitiveness of our producers could also be undermined if other countries chose climate change strategies that are less costly to producers than Australia's.
- *Natural resource management (NRM):* NRM impacts could include increased risk of soil erosion and off-farm impacts from nutrient and pesticide runoff due to more extreme rainfall events.
- *Inputs:* Climate change is expected to increase production costs and the price of key inputs including fuel, fertilisers and transport. Businesses could also have further difficulties in attracting and retaining labour.

4.2 Impacts of climate change policies

In addition to the direct impacts of a changing climate, farm businesses will also be affected by changes in government policies aimed at reducing the extent of climate change. It is believed that growers are more likely to feel the impact of climate policies long before they are seriously affected by climate change itself. Even if agriculture is not a direct participant in the CPRS, the industry will experience increased cost of farm inputs such as electricity, fuel and fertiliser. For example, economic modelling by the Australian Farm Institute suggests that a typical fruit and vegetable farm's cash margin will be reduced by about 3 to 5% in 2016, and 4 to 7% in 2030.

The uncertainties surrounding agriculture's inclusion in the CPRS is limiting the industry's ability to develop adaptive responses. The industry needs the details of the CPRS or alternative policy measures to be finalised as soon as possible to allow the industry to investigate the potential impacts of the scheme and incorporate this information into management strategies.

The impacts of climate policies blur the distinction between adaptation and mitigation. Adapting to policy instruments such as the CPRS will necessarily involve measures to mitigate on-farm emissions. We acknowledge that horticulture must share the burden for reducing Australia's greenhouse gas emissions. Producers will be able to reduce their total carbon footprints through increases in energy efficiency and applying new farm management practices. However, there are limited options for on-farm emissions abatement for horticultural producers compared to some other sectors. The primary greenhouse gas emitted by horticulture is nitrous oxide resulting from the application of nitrogen fertiliser. Attempts to reduce these emissions have a risk of also reducing productivity. Given the intensive nature of horticultural cropping, there are also fewer opportunities to offset emissions via carbon sequestration through activities such as agroforestry.

Growcom will continue to stress that the horticulture industry needs to be considered separately from other agricultural industries, based on observations that:

- Emissions from horticulture are a very small proportion (about 1%) of the emissions from the agricultural sector (i.e. about 0.2% of Australia's total emissions);
- The impacts of climate change are potentially greater for horticulture than other industries because of the temperature dependence of crops and heavy reliance on irrigation water;
- Compliance costs are likely to be relatively high for the large number of small producers in the industry;
- The extreme diversity within the industry will make it very difficult to formulate a consistent industry response to policy developments;
- The potential for on-farm emissions mitigation is limited compared to some other industries.

5. Current and prospective adaptations to the impacts of climate change on agriculture and the potential impacts on downstream processing

Horticultural growers are well-accustomed to dealing with climate variability. Over the next 10 or 20 years, the predicted degree of climate change is likely to fall within current

extremes of variability, with growers able to adapt by using the same strategies they employ now.

However, over time, the sum of these gradual changes will exceed producers' adaptive capacity based on current strategies. This is already evident with extreme events, such as the most recent Queensland drought and Cyclone Larry, placing substantial strains on growers' capacity to adapt and move forward. The horticulture industry must be proactive if it is to be successful in adapting to future climate changes.

A key component to the success of adaptation in the industry will be access to accurate and detailed information on climate changes and how these changes will affect productivity, distribution and marketing of horticultural products. The complex interactions among adaptation strategies, mitigation opportunities and policy implications mean that all of these issues must be considered simultaneously.

However, little information currently exists on the impact of climate change on specific growing regions and it is difficult for growers to know what adaptive practices they should implement to reduce the impacts of climate change on their businesses. The cost price squeeze, with growers' margins getting smaller, as well as the resource barriers faced by industry organisations, has led to reduced or no capacity for growers or the industry to be proactive in preparing for potential climatic impacts.

Overall we know that the best adaptation strategies will vary according to region, commodity and current cropping practices. Simple adaptation strategies include changing varieties and/or planting dates to suit new conditions. In some cases, it may be necessary to employ new technology or techniques to maintain productivity. In severely affected areas, it may be necessary to move production to new regions.

For individual growers, adapting to climate change will fundamentally be an issue of risk management. Some of the risk management strategies and tools required to ensure the industry can be proactive in preparing for potential climatic impacts include:

- *Water Use Efficiency programs:* Industry water use efficiency programs have been successful in up-skilling producers by providing the knowledge and tools that allow them to use water resources more efficiently. In the face of increasing water shortages, extension of these programs is urgently required. A commitment from government is required to further enhance the opportunities for industry-delivered water use efficiency programs as a key step in changing practice on-farm.
- *Water management and storage:* As water is the critical issue influencing the viability of horticulture enterprises, risk management strategies around water management, water security, and on-farm storage will be essential. This needs to include increasing the capacity of growers to collect runoff from rainfall events and significant government investment in water distribution infrastructure, including recycled water for irrigation use.
- *On farm biosecurity programs and integrated pest management:* Increasing the awareness, preparedness and response capacity of individual enterprises, the community and the industry in relation to the increased pest management and biosecurity challenges associated with climate change is essential.

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- *Site and crop selection:* Those areas that may become risky, or perhaps more suitable, for certain crops under future climates can be identified through spatial climate modelling. It is possible that we may see a southward expansion of areas suitable for tropical and subtropical crops and a corresponding contraction of areas for temperate crops. Local topography will also play a role. Growers will need this information with sufficient lead time to be able to plan their production decisions.
 - *Management of the impacts of weather events:* Increasing growers' capacity and providing them with the tools to minimise the impacts of extreme weather events. This should include:
 - Installing crop netting to reduce the potential damage of extreme weather events;
 - Implementing multi-peril crop insurance schemes;
 - Applying protective sprays to avoid instances or intensity of crop sunburn damage;
 - Incorporating the challenges of climate change into natural disaster risk management systems;
 - Improved mid-range weather forecasting to facilitate adaptation.
 - *Strategic planning:* Accurate information relating to critical issues such as temperature and predicated rainfall would allow growers to implement actions that will ensure the viability of the current season's crop. For example increasing growers' capacity to predict long term temperature viability at a regional level would allow producers to plant or harvest at the most optimal times.
 - *Farm Management Systems (FMS)* – Support is required to further develop FMS programs as an effective method of managing business risks regarding climate change. A focused module would assist growers in identifying risks, assessing information management resources and prioritising response actions. Focus areas need to include biosecurity and soil health. Growcom has developed an industry FMS with targeted modules such as water quality and water use efficiency that has significantly enhanced growers' capacity to manage business risks in the targeted areas. We would welcome the opportunity to provide the Committee with more information on this initiative.
 - *Soil health initiative:* Soil health is essential in growing profitable food crops, however climate change is likely to provide additional challenges. This initiative needs to identify enhanced nutrient management strategies, capturing soil acidification and salinity, providing greater pest management protection, improving ground cover to reduce erosion, and enhancing the water holding capacity of soils. Improved soil health also increases soil carbon sequestration.
 - *Diversifying strategies:* To reduce the overall risks facing a business, it is necessary to undertake a variety of diversifying strategies both on farm and off farm. These may include alternative cropping techniques or diversifying across multiple crops or regions. Further investigation is required on diversifying strategies that producers could implement to reduce the overall climate change risks facing their farming enterprises.

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- *Efficient supply chain management:* Implementing practices to reduce compliance costs and/or improve returns such as monitoring trends in market/regional production and demand to take advantage of market opportunities and implementing transportation/storage strategies that reduce the time and distance taken to deliver product from the farm gate to the consumer.
 - *Implementation of Queensland climate change response strategy:* Growcom has identified the priority needs for the Queensland horticulture industry, with the key strategies including:
 - Building a detailed understanding of how climate changes will affect horticultural industries and horticultural production regions;
 - Delivering an industry information campaign to increase awareness and knowledge of climate change amongst fruit and vegetable growers;
 - Developing and delivering information on management practices and responses that are effective for climate change adaptation;
 - Encouraging horticultural commodity and regional scale action and research investment in climate change issues;
 - Developing communication plans to guide information sharing and flow within and between industry, government, consumers and the general public regarding climate change and horticulture issues.
 - *Horticulture Industry Workforce Plan:* Climate change could lead to businesses facing further difficulties in attracting and retaining labour due to impacts such as changes in travel patterns leading to a reduction in the number of backpackers seeking employment opportunities in the industry. To combat further challenges relating to attraction and retention of labour, funding is required to implement the Horticulture Industry Workforce Plan developed by Growcom through funding provided by the Department of Agriculture, Fisheries and Forestry (DAFF). This plan identifies strategies and recommendations under five key headings: skilled permanent workforce; work-ready, available and reliable harvest workers; growers as fair employers; infrastructure to support workers in the industry; and positive industry and government relations.
 - *Incentives:* Producers require incentives and assistance to change business practices and implement risk management strategies that may increase their overall operational costs. Growcom seeks further investigation of a range of incentives that can be used as a catalyst for developing an industry resilient to climate change impacts.

6. The role of government

The horticulture industry requires support from government in helping producers both adapt to the physical impacts of climate change and associated challenges, as well as providing assistance to manage the impact of government policies aimed at mitigating the impacts of climate change.

This support should assist in creating a favourable environment which encourages a more proactive approach to managing climate change. This environment would involve access to information, education and training, and increased funding to help industry identify, develop and implement adaptation strategies and tools that reduce the impacts of climate change. Assisting producers to respond to and manage climate change has

benefits beyond industry when taking into consideration the reliance of many regional economies and communities on the horticulture and broader agricultural industries.

Ongoing successful government research, extension and incentive programs will be vital in assisting growers and their communities in adapting to a changing climate. A partnership and incentive approach by government will deliver the best outcomes and promote resilience in the horticulture industry in the face of climate change.

Growcom also believes government support is required for established industry programs, such as water use efficiency and industry Farm Management Systems that have proved successful in other applications, but could be refined to assist growers to tackle the challenges of climate change.

We believe the role of government in helping producers adapt to the physical impacts of climate change includes:

- *Investment in research, development and modelling to meet critical information needs:* For the industry to effectively respond to climate challenges, accurate and detailed information on regional-scale climate changes and how they will affect production and marketing is required. This information is critical to inform the development of management strategies at enterprise, regional and industry scales to effectively manage future climate change impacts. Currently there is inadequate data to support the level of analysis and planning that will be required to ensure industry adjustment to climate changes.
- *Appropriate policy settings, particularly relating to water management, planning and associated infrastructure:* A review of state and national water management arrangements are essential to ensure water markets and allocation processes are:
 - Providing timely and accurate information to growers that allow them to properly plan for available water supplies and manage the risk of low supplies;
 - Ensuring water market planning and processes work effectively, including water licensing and trading;
 - Allowing flexibility in growers' capacity to store, source and use alternative supplies (particularly recycled water, ground water or overland flow water).
- *Partner and assist industry to deliver their own extension* such as risk management modules within industry Farm Management Systems.
- *Funding programs and initiatives:* Establishment of funding programs and initiatives to identify, develop, implement and evaluate the specific risk management strategies, tools and supporting information that is required by each industry to enhance their resilience to climate change impacts, such as those identified in section 5.
- *Distribution of information:* The need for direct two-way communication of climate issues and science between growers, their industry associations, research agencies and government. Conflicting information presented through the mainstream media should also be responded to appropriately.

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- *Benchmarking studies:* Government has a role in investigating whether the adaptation and mitigation strategies used in Australia are having positive or negative impacts on our industry's international competitiveness. Benchmarking studies could lead to further enhancements in our productivity and international competitiveness.

We believe government also has a role in helping producers manage the impacts of government policies. This role includes:

- *Working closely with industry* to identify critical industry issues and develop effective policy responses to climate change and carbon emission management. This needs to include an effective communication and engagement strategy.
- *Carbon footprinting:* The need for a rigorous and agreed national framework or standard to guide industry carbon footprint assessments, particularly in setting the scope or boundaries of the assessment to avoid double counting of emissions through supply chains and a consistent methodology to allow comparisons between industries.
- *Separating horticulture from other agricultural industries:* Growcom strongly believes that the horticulture industry must be considered separately from other agricultural industries during policy development, given the very low emissions, high impacts, high industry diversity and high compliance costs likely to be associated with policies aimed at the agriculture sector.
- *The CPRS:* The details of the CPRS and its application to agricultural industries must be finalised as soon as possible to allow the industry to investigate the potential impacts of the scheme and incorporate this information into management strategies. The uncertainties surrounding agriculture's inclusion in the CPRS are limiting the industry's ability to develop adaptive responses. These uncertainties include:
 - Whether or not agriculture will be included, and whether all agricultural industries will be included together;
 - The timing of inclusion;
 - The threshold for participation, which the white paper suggests may not be the general threshold of 25 000 tonnes CO₂-e;
 - The point of obligation – on farm, upstream or downstream;
 - Compliance costs;
 - Alternative policy measures. The Government's white paper suggests that, if agriculture is not included in the CPRS, it may apply alternative policy measures that impose similar costs for emissions. However, there is no clear indication of what these measures might be and whether a similar emission threshold might apply. It is possible that these alternative measures may actually impose greater costs than the CPRS on small horticulture operations without providing incentives for on-farm emissions abatement.
- *Kyoto Protocol and other international negotiations:* Government can assist the industry by representing its interests in international negotiations concerning climate change policy. Growcom strongly supports the Australian Government's submission to the United Nations Climate Change Conference in Copenhagen

which seeks to modify the accounting rules for natural disasters, inter-annual variation and harvested wood products in ways that will be beneficial for the horticulture industry.

7. The role of research and development

The role of research and development in assisting farmers to adapt to the impacts of climate change is one of high importance. The industry needs to be well informed to ensure smart investments are made in research and development that enhances the industry's ability to respond to climate change challenges and be well positioned to minimise any impacts, capitalise on any opportunities, contribute to carbon emission reduction and influence government policy development.

Research and development has a role in:

- Generating industry growth and innovation;
- Enhancements in climate science and regional modelling;
- Ensuring Australia's food security in light of domestic and global climate challenges;
- Filling critical information gaps.

Significant effort and investment is urgently required to improve the knowledge base for climate change and intensive agriculture to underpin the development of industry and government policies and response strategies. Growcom continues to work with research institutions and industry partners to develop practical and cost-effective strategies to assist the industry to respond to climate change.

Additional research and development investment is required in numerous areas including:

- Climate science, modeling and projections for key horticultural production regions along with risk and vulnerability assessments;
- Defining critical temperature thresholds for production of key horticultural commodities and regions;
- Improved mid-range weather forecasting to allow growers to adapt their farm management to suit the conditions expected in the coming seasons (such as planting more drought tolerant varieties when necessary);
- Technology advancements and alternative energies;
- Breeding plant varieties resistant to proposed climate impacts;
- Potential pest and disease outbreaks and mitigation strategies;
- Separating horticulture from other agricultural industries to obtain a greater picture of climate change impacts and emissions;
- Effects of elevated carbon dioxide levels on a range of crops and weeds;
- Likely impacts of climate change on water supplies and the security of water entitlements/allocations and the options available to improve water harvesting regulations and operating rules for water storages to secure supplies;
- Documenting the financial viability of specific practices that reduce emissions, increase carbon uptake and increase productivity (minimum till, fertiliser use efficiency, controlled traffic, stubble retention, orchard management, agroforestry);
- Identifying optimum rates of nutrient application to balance productivity and minimisation of carbon emissions;

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- Assessing how horticultural enterprises could participate in and benefit from emerging carbon offset markets with specific reference to soil carbon and perennial horticultural plantings.

8. Recommendations

Growcom believes the following recommendations need to be adopted by the Committee:

- Mitigation strategies must be considered alongside adaptation strategies as they both form part of managing the impacts of climate change at a farm level. Considering these strategies separately could lead to increased risk of unintended outcomes such as policies that reduce the viability of the horticulture industry, or the implementation of adaptation strategies that may actually increase emissions.
- The Committee needs to separate horticulture from other agricultural industries throughout the inquiry and provide an outline of adaptation requirements and potential strategies unique to each agricultural industry.
- Increased government funding is required to fill critical information gaps that will form the basis of industry adaptation strategies.
- Research and analysis is required that outlines that impact of an emissions trading scheme on the future viability of the horticulture industry and broader agricultural sector. This should include what carbon emissions are evident in horticulture, potential for these to be reduced and the potential for offsets.
- Review of government policies that impact on the horticulture industry's ability to respond to climate change to ensure these policies support growers in their efforts. This needs to include water resource management and planning policies.
- Industry organisations are given the responsibility and resources to work directly with their members on tackling climate change issues, as industry groups are best placed to design programs that work with the business, market and regulatory needs of producers. This should include an information and education program.

9. Suggested further reading

Suggest further reading includes:

- Queensland Farmers' Federation: A Farmer's Guide to Climate Change in Queensland (2009);
- Growcom's Queensland Horticulture Climate Change Response Strategy (2009);
- Growcom's submission and the final report of the Senate Standing Committee on Rural and Regional Affairs and Transport's Inquiry into climate change and the Australian agricultural sector (2008);
- Horticulture Industry Workforce Plan (2008);
- Scoping study – climate change and variability – risk and opportunities for horticulture (Peter Deuter 2006);

Growcom is willing to supply more information if requested.

10. Conclusion

Industry based Farm Management Systems continue to provide a highly effective risk management framework for managing producers' response to climate change. Combining information on adaptation and mitigation into appropriate decision making tools, such as FMS, will significantly enhance the horticulture industry's success in managing climate change impacts. The key requirements to this success will include:

- Industry and Government commitment and funding support;
- Separating horticulture from other agricultural industries;
- Access to critical information needs;
- Appropriate government policy settings that compliment growers' efforts to respond to climate change.