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A message from our Chair

A warm welcome to the final edition of Growing Undercover for 2021.

As we close out yet another challenging year, I would like to thank all our members and corporate partners for your ongoing support.

There is great interest around the protected cropping sector in Australia currently. Discussions have commenced with the Australian Government, Hort Innovation, and other partners about funding to implement the recently launched Protected Cropping 2021 – 2030 strategy.

Here at the Sydney Markets, there is a renewed sense of optimism that the country is learning to live with the COVID-19 virus and the disruption it has caused across the whole supply chain.

In my current role with VegNET, extension events have recommenced face to face. It is pleasing to hear growers using a range of tactics to control Serpentine Leaf Miner which has devasted a range of crops over the last two years.

I caught up with one of our flower grower members Sam Dominello and his team recently to congratulate them on their recent Flower Grower of the Year award. Many in the nursery and floriculture industry have reported record trading results during the COVID pandemic which is great news for this sector.

In discussion with other growers and the wider industry around protected cropping industry of late, the ongoing labour shortages, rising input costs, supply chain disruptions due to COVID-19 and lack of options to dispose of waste, plastic and netting are constantly raised in conversations.

Matthew Plunkett • *PCA Chair*

One of the most critical issues for our growers is the need for a nationally consistent classification code for greenhouse structures. Lack of adequate insurance options have also been raised regularly in lieu of the storms and natural disasters experienced in many states and territories in recent years. We hope our grower members who have experienced storm damage and loss of income in recent months are recovering well.

The PCA will continue to advocate bringing forward the Greenhouse Construction Code Schedule of Works from 2025 and continue to raise this issue at both a Federal, State and Local Government level.

The PCA Conference is just around the corner in March 2022 and our team are extremely excited to bring you a program that has something in it for everyone. Everyone is excited about learning and reconnecting in Coffs Harbour in what will be a great conference. Thank you to all those who have registered, sponsored and plan to exhibit to date. Check out the website for the latest program update at:

www.pcaconference.net.au

On behalf of all the PCA Directors, our team at ASN Events, our Contractors, Greg Fraser & Jennifer Stackhouse, we wish all our PCA members, corporate members, and subscribers a very Merry Christmas and a New Year filled with renewed optimism, fair prices, and good fortune.

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Satvinder Pannu discussing irrigation management strategies in Raspberries at Bucca NSW.

Sam Dominello and Matt Plunkett at the Sydney Flower Markets stand.

Increased support to expand protected cropping in the Australian Tropics

By Elio Jovicich (Department of Agriculture and Fisheries)

Protected cropping (PC), an emerging production system in the Australian tropics. Historically, growers in tropical Australia have been slow to embrace PC technologies, mainly because temperatures and light levels are suitable for extensive open field fruit and vegetable production. Recently, PC technologies have become more prevalent in the tropics as they can mitigate risks associated with climate variability and assist in accessing domestic and export markets. Adoption of PC in northern regions in WA, NT and QLD has increased in the past 10 years, mainly with investments in what is considered low and medium technology systems (e.g., those that include structures such as high passively ventilated greenhouses, high poly tunnels and shade/screen houses). PC is being used widely in blueberries and, to a lesser extent, in high value vegetables and tropical fruit trees. Although the new areas under PC in the tropics are small compared to southern regions in Australia, they represent a proof-of-concept that has been generating interest from regional outdoor growers, produce distributors and other investors (Figure 1). There are many aspects of these farming systems that still need to be advanced for warm climatic regions.

Increased support to expand protected cropping in the Australian Tropics (cont.)

The Queensland Department of Agriculture and Fisheries (DAF) PC team has been working with regional farmers in on-farm crop evaluations in north Queensland since 2009. To enable PC adoption, research activities have been considering economic and environmental aspects within the context of resource diversity and availability and target markets. Research by DAF and collaborators across northern Australia suggests that, for some high value fresh products, fit-for-purpose PC technologies are a cost-effective way for growers to mitigate the effects of extreme temperature, rainfall, changes in humidity, wind, solar radiation and pest and disease pressures which can negatively impact yield, quality, and consistency of supply. Research for development of suitable PC systems for growers in northern Australia has been focusing on awareness, proof of concepts, structure designs, advice, and information sharing. Discussions with industry stakeholders, expert advice, on-farm demonstrations and trials, and industry study tours have been critical for the identification of cost-effective structure designs, suitable crops, and agronomy practices.

Growing in a challenging environment. In the tropics and where many high value crops benefit from rain protection, cladded PC structure designs need to be high and capable of evacuating heat efficiently. During periods, structures may need screens to shade crops and misting/fogging systems to cool canopies and/or increase relative humidity levels.

Plants grow fast and evapotranspiration is high, which requires a well-managed fertigation system. Issues with pests and some diseases can limit production in warm environments if they are not managed with an integrated approach. Potential structural damage from cyclonic winds in these regions can be mitigated if the PC design can rapidly retract the cladding from its roof and sidewalls.

New infrastructure and resources to support industry growth. To further support PC adoption in the Australian tropics, DAF established a new PC research and demonstration site at the Ayr Research Facility (ARF) in north QLD in mid-2020. The selected structure is a fit-for-purpose retractable roof structure with a floor area of 900 m2 (Figure 2). The site is a showcase for novel technologies for the tropics which can demonstrate improved ventilation, crop environment, and reduced risk of structure damage in the event of a cyclone. Regular stakeholder visits to the site are helping industry with the much-needed decision making support on PC systems in warm environments.

The current crop growing area has been setup for soilless production in different plant containers placed on-ground and on raised gutter systems. We have been using coconut coir fiber, perlite, and pine bark as root media. The fertigation system was designed independently schedule water and nutrients to small crop plots. Media moisture and solar radiation sensors and an automated drainage collection system are used to schedule fertigation events. The retractable roof has clear cladding and has a retractable insect-exclusion screen underneath. The retraction of roof cladding and roll-up side curtains allow management of the crop environment through passive ventilation. A controller operates the roof and curtains through electric motors and uses sensor-gathered data and activation setpoints for rainfall, wind, temperature, relative humidity, solar radiation, and media temperature. The structure frame is covered with insect exclusion screens fixed all-around. Inside, an overhead misting system was added to provide additional cooling to the plant canopies. Misting also helps increase air relative humidity from July to November. A significant capital investment for the structure materials, construction, office and support infrastructure and equipment in this research site was close to $0.5M. DAF also allocated new staff to specifically work on PC systems for vegetables, fruit trees, and berries, as well as potential tropical crops.

Early results are promising. To date, the DAF PC team has grown crop plots of capsicums, eggplants, climbing beans, specialty melons, and tomatoes at the ARF (Figure 3 and 4). Since the first crops were established in September 2020, results are indicating that year-round production in the north QLD tropics is possible. Crops that we grew during summer produced very well under the applied technology and agronomic practices, despite outdoors' high temperatures and intense rain conditions.

We grew capsicums in single rows and supported plant canopies using a modification of the traditional Spanish trellis system (i.e., layers of horizontal strings extended along both sides of the plant row). This system uses very little pruning of shoots compared to the "V" trellis system; therefore, it creates plant canopies with a greater number of branches and leaves (Figure 5). In warm environments, less pruning in capsicums leads to a lower number of fruits with blossom-end rot and less labour inputs. The denser canopy also creates a better host environment for beneficial insects and mites. With more shoots, plants also have a better chance to recover from broadmite (Polyphagotarsonemus latus) infestations if these are managed.

The harvesting periods in cucumbers (both Lebanese and continental types) and tomatoes were extended when we layered plants after the main stems reached the 3-m overhead wire. We pruned and trellised eggplants to the "V" system and were able to incline stems gradually to about 60 degrees to harvest

Increased support to expand protected cropping in the Australian Tropics (cont.)

additional fruit. In large production areas, the adoption of high trellising practices (e.g., >1.8 m) would benefit from using pipe-rail trollies. Growers will need to assess the cost-benefit of mechanization if they aim to harvest crops for longer periods (which reduce unproductive time and labour inputs) and compare it to growing several crops trellised to lower heights (which creates a longer unproductive period and increased labour inputs). To date, we have indication that in north Queensland, a retractable roof structure design allows improved environmental management compared to growing crops in high passively ventilated greenhouses (e.g., saw tooth design with vertical roof vents) or high polytunnels. Therefore, the improved passive ventilation and longer harvesting periods under a retractable roof should better support the consideration of mechanization. Biological control practices have been used to effectively manage pests when used in integrated management programs. We are looking at testing more 'banker plant systems' to maintain a population of beneficials under the structure.

Overall, fruit quality in harvested crops has been excellent. A range of non-traditional crops that could benefit from PC technology are also being identified, e.g., specialty melons, beans, ginger, turmeric, and tropical fruit species (Figure 6 and 7). We are encouraged by the progress made with these initial crop evaluations and we will continue to adapt agronomic practices and explore production methods for new crops.

Benefits to a range of stakeholder groups. Regional growers, PC input and service suppliers, researchers, university and high school students, and state government representatives have been inspecting crop plots grown under the retractable roof structure. Visitors have been able to assess visual and eating quality of fruit and observe the improved productivity per square metre. Visitors can learn about fit-for-purpose technologies and practices that mitigate climate variability and create new opportunities for supplying domestic and export markets. One-to-one and group visits have been allowing growers to discuss whole-of-enterprise PC systems relevant to their specific situation. For example, during the visits they discussed production for targeted markets; marketing and product differentiation; business scale; geographical location; appropriate technology; inputs and services; labour and skills; PC knowledge; and data gathering and interpretation. Agronomy practices are frequently discussed and include environmentally sustainable options for managing pests, diseases, water, and nutrients. These events are allowing us to gather feedback on a range of constraints to adoption and expansion of PC in northern Australia.

As with PC investments in other climatic regions, infrastructure and agronomy needs to be fit-for-purpose. For commercial businesses, economically and environmentally sustainable PC production in the tropics will require applying a systems approach to management to address objectives in sound business plans.

Funding initiatives and key projects have been supporting protected cropping in the tropics and subtropics. DAF has been leading several projects resourced or co-resourced by Queensland Government, Horticulture Innovation Australia Limited, Australian Centre for International Agriculture Research (ACIAR), and the Cooperative Research Centre for Developing Northern Australia (CRCNA).

Contact for additional information. Elio Jovicich, Program Leader – Protected Cropping Queensland Department of Agriculture and Fisheries (DAF), email: elio.jovicich@daf.qld.gov.au

Figure 1. PC in the tropics has reduced costs because fuel for heating is not required. A good knowledge about cost effective technologies and agronomic practices is essential to grow good crops in warm environments. Mechanisation will be critical to reduce labour costs and improve efficiencies in larger covered areas.

Figure 2. A retractable roof structure was set up at the DAF Ayr Research Facility to showcase novel technologies for the tropics that can mitigate risks associated with climate variability and assist accessing domestic and export markets. Crop evaluations are carried out and regular stakeholder visits to the site are helping industry with the much-needed decision making support for PC systems in warm environments.

Figure 3. (Back to front) Matt Tinai, DAF Technical Researcher, Heidi Wittl, DAF Horticulturist, and Elio Jovicich, Program Leader PC, working on a specialty melon crop plot in the new retractable roof structure at the Ayr Research Facility.

Figure 4. The first crop plots were established at the DAF Ayr Research Facility in late 2020. A small fertigation unit can deliver water and nutrients to different plots.

Figure 5. A crop plot of long sweet capsicums ready for the first fruit pick at the DAF Ayr Research Facility.

Figure 6. Specialty melon trials have been conducted to fine tune agronomy practices and compare productivity and quality of fruit types and cultivars. Because fruit number is limited to a position in the plant, they can be managed to reach total soluble solids with estimates of 12 to 16 °Brix.

Figure 7. A specialty melon crop in a warm sunny day at the DAF Ayr Research Facility. Only the insect exclusion net was left extended. Overhead misting can be used in some crops to lower leaf temperature.

Thank you to all those who participated in our 2021 Member Survey. We appreciate all your feedback!

2021 Australian Cannabis Awards

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4 Tips for Greenhouse Energy Efficiency

By DryGair

It's no secret that soaring energy prices have a massive effect on greenhouse growers. Rising prices make growing less profitable, and the fluctuating energy market makes it difficult to plan ahead, leaving many growers wondering how to move forward.

One of the best ways to handle the energy crisis and prepare for the future is simply to use less energy. Increasing your greenhouse's energy efficiency can do wonders, cutting your energy usage by 50% or more.

1. Using Dehumidification

One of the main ways energy is wasted in a greenhouse is ventilation. It can be completely understood – humidity rises in a closed greenhouse, and you need to dispose of it somehow.

But ventilating means losing all the heat you generate with your heating system. Meaning you need to continuously heat, in order to maintain the right temperature for your plants.

A much more efficient method to deal with humidity is dehumidification. Using a dehumidifier lets you close the greenhouse, retaining all the heat inside, without having to worry about humidity or related diseases.

Using the right dehumidifier in your greenhouse can save as much as 50% on energy, compared to heating and venting. That's a big difference!

2. Incorporating Thermal screens

Another piece of equipment that can help avoid heat loss is a thermal screen.

Installing and deploying a thermal screen helps trap the heat inside the greenhouse, reducing the overall need for heating.

Many growers already use a thermal screen. However, you can combine 2 or even 3 screens to drastically increase their efficiency.

One thermal screen reduces heat loss by around 60%. But 2-3 screens can push that figure up to 90%.

3. Installing Real-time Monitoring systems

Controlling your greenhouse climate is no simple task. It's a constant process and there's a lot to consider. So, one common expense many greenhouse growers share is simply doing too much – overrunning heating systems, using dehumidifiers for longer periods than necessary, etc.

These expenses can be cut substantially by incorporating real-time monitoring systems.

Being informed, in real-time, as to what the conditions are in the greenhouse lets you do exactly what's necessary. If it's cold, turn on the heating pipes, but if the temperature is right, don't. The same is true for humidity.

Installing monitoring systems is a relatively simple way to greatly reduce energy expenses.

4. Switching to Efficient Lighting

Not all greenhouses use supplementary lighting, and many that do, already use more efficient lights. However, many growers still use older, less efficient lighting technologies.

Switching your lighting to modern LEDs can save as much as 40%, compared to CFL bulbs, or up to 90% compared to incandescent bulbs.

Introducing any piece of equipment, or changing your current setup, is undoubtedly an expense. But with rising and fluctuating energy prices, this may be the right time to consider change, as it can make a major difference in your bottom line in the coming years.

Recent Events and Webinars

By Elio Jovicich (Department of Agriculture and Fisheries)

Protected cropping regional event in Gatton

Growers, researchers, service providers and key industry stakeholders had the opportunity to learn about protected cropping at a recent Department of Agriculture and Fisheries (DAF) event at held at the Gatton Research Facility. DAF's senior horticulturist Dr Elio Jovicich discussed opportunities for expanding protected cropping in the tropics and subtropics, and DAF's principal plant pathologist Dr Cherie Gambley talked about plant viruses in several protected cropping crops and practices to minimise their occurrence. DAF's senior horticulturist Dr Roberto Marques provided an overview of postharvest issues in intensive horticulture and DAF's senior plant protectionist John Duff discussed damage and integrated management of the new serpentine leafminer, Liriomyza huidobrensis. Attendees also heard from Professor Salah Sukkarieh, CEO of robotics company, Agerris. Shané Steffen from Protected Cropping Australia explained the benefits of joining the peak industry body, while Zara Hall from Lockyer Valley Growers talked about plastic waste disposal and chemical safety. DAF's senior agribusiness development officer Bronwyn Ford informed growers about funding opportunities and provided COVID-19 updates for regional horticultural businesses. After the presentations, attendees were invited to network during a barbeque dinner. This event was coordinated as part of a new DAF project, Driving ag-tech adoption across Australia. The project is funded by the Hort Frontiers Advanced Production Systems Fund, which is part of the Hort Frontiers strategic partnership initiative developed by Horticulture Innovation Australia, with co-investment from DAF.

Protected cropping webinar

The Department of Agriculture and Fisheries (DAF) recently hosted a protected cropping webinar for members of the vegetable industry. The webinar featured presentations from DAF's Dr Cherie Gambley on identification and strategies to manage viral diseases, and Dr Elio Jovicich on research and adoption of protected cropping in the tropics. Dr Len Tesoriero from the New South Wales Department of Primary Industries shared information about risk mitigation strategies for tomato canker disease. Listen to the complete series of DAF's vegetable industry webinars.

Tell us your story!

People love hearing about what their peers are up to - and we're always on the lookout for news about what's going on in the protected cropping industry. Our monthly e-newsletter, Growing Undercover, is a great place to catch up on these stories.

If you've got something you'd like to share, or there's an issue you'd like addressed, we're all ears.

Please give us a call on +61 (0) 3 8560 4391 or via email: protectedcropping@asnevents.net.au

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