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FRONT COVER

Fruit and vegetable breeding company Rijk Zwaan is marking 100 years in business expanding from a small seed store in The Netherlands to an international company. Varieties include 'Sweet Palermo Yellow' capsicum (shown on cover). Read the full story on page 17.



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Welcome to the summer issue of *Soilless Australia*, which has a member focus as we celebrate the long and fascinating history of Rijk Zwaan and the business he created. Over a century, his seed shop evolved into an international business. We also discover more about Jiffy from GCP (see page 40), meet PCA Board member and Conference Chair, Zak Iqbal (see page 24), and hear more from PCA Chair, Andrew Tout. He has contributed our 'Last word' opinion piece in this issue with a few well-penned words on vertical farms (see page 42).

We are also taking a long look at tomato brown rugose fruit virus (ToBRFV) from its discovery in South Australia to today's hopefully good news that the virus hasn't spread beyond three affected farms near Adelaide. To better understand what unfolded from the announcement of the disease's detection, see our story on page 26.

PCA corporate member Royal Brinkman was quick to arrange a very helpful and well-presented industry webinar to educate growers about the virus and the importance of hygiene in the greenhouse to help stop the disease's spread. Using the company's experience with ToBRFV in other parts of the world, speakers shared very practical information with PCA members. Judging by the number of questions, it was information that everyone wanted to know. That webinar is still available to view on the PCA website.

Stephanus Malherbe reports on a new online course to help understand and manage the virus. As Stephanus notes in his update on page 32, government departments and industry stakeholders provided one-page summaries that contained only general information, but growers needed practical insights gleaned from real-world experiences. This course is one way to get that information.

PCA Executive Officer, Julie Krieger, also announces a new membership fee structure for grower members. Catch up with what's new in PCA on page 8.

Be a cover star

This issue's cover features Rijk Zwaan's 'Sweet Palermo Yellow' capsicum growing in a greenhouse. This is one of the company's popular varieties and part of the company's 100-year story which is outlined on page 17.

We'd like to showcase other protected cropping businesses on the cover of *Soilless Australia* magazine.



Rijk Zwaan in 1970.

If you have a cover shot, we'd love to hear from you at editor@protectedcropping.net.au to consider it for the cover. The photo must be high resolution, good quality, fit the square format of our cover image and be accompanied by a small story.

As more businesses investigate new technology, celebrate business milestones or have news to share, *Soilless* is a good way to communicate with others in the protected cropping industry across Australia – and beyond. The deadline for the next issue, which is autumn 2025, is January 31. Send your best shots!

Jennifer Stackhouse, Editor

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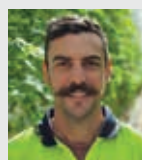
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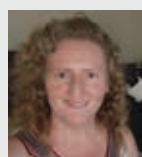
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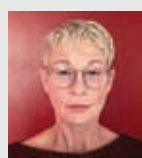
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PCA remains at the forefront of advocacy and involvement in projects supporting biosecurity measures and innovation in decarbonisation and environmental stewardship.

I am pleased to share updates on two critical areas where PCA is actively supporting our members and driving industry resilience: biosecurity management of tomato brown rugose fruit virus (ToBRFV) and our pioneering efforts in decarbonising glasshouse agriculture.

ToBRFV outbreak and biosecurity preparedness

Current situation: ToBRFV, detected in South Australia in August 2024, poses a risk to our \$5.8 billion vegetable industry, particularly impacting tomatoes, capsicums, and chillies. The virus is highly contagious and can significantly affect crop quality and yield, with symptoms like mosaic patterns and deformations that reduce marketability (for the timeline of how the TOBRFV story unfolded in Australia, see page 26).

Although there are encouraging signs that the virus may be contained, PCA remains somewhat in the dark due to our lack of observer status in biosecurity discussions. We continue to advocate for a reversal of this decision to ensure we can represent our members' interests more effectively.

“PCA'S MEMBERS IN GLASSHOUSE AGRICULTURE ARE LEADING THE WAY IN EMISSIONS REDUCTION.”

In a related matter, PCA's formal membership application with the Emergency Plant Pest Response Deed (EPPRD) is advancing, with a decision anticipated at the Plant Health Australia AGM which was held in late November.

Membership would allow PCA to contribute directly to biosecurity decision-making and better support our members in future outbreaks if and when they occur.

In the light of ToBRFV, we urge all members to implement strict farm hygiene practices and biosecurity protocols to protect against potential spread. PCA remains committed to supporting growers as we address this significant biosecurity concern.

Pathways to a sustainable future

PCA's members in glasshouse agriculture are leading the way in emissions reduction. Many growers have already implemented innovative decarbonisation strategies, achieving reductions of over 50 per cent in their operational emissions through renewable energy, energy efficiency, and carbon offset projects.

Many growers have successfully integrated renewable energy sources, such as solar and biomass, into their operations, significantly reducing reliance on fossil fuels.

Upgrades in LED lighting, insulation, and heat recovery systems have enabled growers to optimise energy use and cut emissions substantially.

The adoption of advanced technologies like Rainbow Bee Eater's ECHO2 system is transforming organic residues into clean syngas and biochar, providing sustainable heating solutions for glasshouses. For instance, the first ECHO2 commercial module supplies heat to the Holla-Fresh glasshouse in South Australia, and a forthcoming ECHO2 '6 Pack' is set to provide heat to Katunga Fresh in Victoria.

PCA is actively working with Hort Innovation Australia and Advanced Horticultural Research to drive further progress. PCA is championing cutting-edge decarbonisation strategies across the industry, developing frameworks that support the unique needs of protected cropping, and helping growers meet and exceed future environmental standards.

Through these initiatives, PCA remains at the forefront of advocacy and innovation, leading the protected cropping industry in sustainable practices and environmental stewardship. These topics will also be discussed in our upcoming PCA Conference 2025 in July in Brisbane (see page 16 for more details). If you have a sustainable story to share, contact our editor, Jennifer Stackhouse, at editor@protectedcropping.net.au or call her on 0488 047 011.

PCA is dedicated to supporting our members in navigating these complex challenges. Thank you for your ongoing commitment to a sustainable future for our industry.



Andrew Tout, PCA Chair

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New membership categories are set to strengthen the future of our industry reports Julie Krieger.

At Protected Cropping Australia, we understand the importance of having a strong, united voice representing growers across the country. That's why we're thrilled to announce the launch of our new Grower Membership categories. The PCA Board is proud to introduce these new membership tiers – Grower Individual and Grower Corporate – at significantly reduced fees to reduce the barriers to joining and encourage as many growers as possible to be part of the PCA community.

For just \$50, individual growers can access all the benefits of PCA membership, while corporate growers can join for \$220, inclusive of up to five employees on the membership. (Note: existing grower members will have their fees automatically adjusted on next renewal.) These reduced rates reflect our commitment to supporting growers and ensuring their needs are front and centre in every conversation we have with policymakers, educators, researchers, and industry leaders.

Why this matters more than ever

The recent tomato brown rugose fruit virus (ToBRFV) challenge has demonstrated just how critical it is to have strong, unified grower representation. As we have worked together to tackle this serious issue, we have seen firsthand the value of having as many voices as possible advocating for the sector. When growers come together, our collective voice becomes stronger, and that strength is crucial in times of both opportunity and challenge.

Whether it's navigating regulatory changes, addressing biosecurity threats, or advocating for research and innovation, PCA is here to ensure growers are heard. We know the best outcomes are achieved when those who work directly in the field are actively involved in shaping the policies that affect them. That's why growing our membership base is so important.

Membership benefits for growers

Becoming a member of PCA is more than just gaining access to resources – it's about being part of a larger community dedicated to the growth and sustainability of the protected cropping industry. Here are just some of the benefits that Grower members will enjoy:

- **Exclusive industry updates** Stay informed with the latest news, trends and advancements in protected cropping. As a member, you'll receive timely updates on regulations, market shifts, and innovations that impact growers directly.
- **Technical advice and support** Tap into expert advice and guidance tailored to the needs of growers. Our members gain access to technical resources that help improve productivity, sustainability, and profitability.
- **Training and professional development** Access our comprehensive library of training materials and participate in exclusive educational programs designed to enhance your skills and knowledge. Our in-built learning platform offers courses that cover a range of topics, from pest management to advanced growing techniques.
- **Networking opportunities** Connect with fellow growers, industry suppliers and experts, and key stakeholders through PCA events, online forums, and webinars. These networking opportunities allow members to exchange knowledge,

collaborate on challenges, and explore new business opportunities. And of course, receive exclusive grower registrations for PCA conferences.

- **Advocacy and representation** PCA works to represent the interests of growers in government discussions, industry forums, and with a range of stakeholders. The more growers we have in our membership, the more powerful and influential our advocacy becomes, helping to shape policies and regulations that benefit the entire sector.

Why your membership matters

By joining PCA as a Grower Member, you're not only gaining access to these valuable resources and services – you're also making an investment in the future of your business and the industry as a whole. As we've seen with the ToBRFV response, collaboration and unity are essential for tackling industry-wide challenges.

In addition, PCA is committed to ensuring that growers' voices are heard in critical conversations about the future of protected cropping in Australia. Your membership amplifies that voice, ensuring that decisions made by policymakers and industry leaders reflect the needs and priorities of those at the industry's heart: the growers.

We encourage you to take advantage of these reduced membership fees and join the PCA community today. Your involvement ensures we can continue building a stronger, more resilient industry that benefits all growers across Australia.



To follow the ToBRFV story as it unfolded in South Australia, see our timeline on page 26.

Julie Krieger
Executive Officer, PCA
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Record returns for investment in horticulture

Hort Innovation's annual report highlights \$5.60 for every dollar invested in the horticulture industry. The *2023-24 Hort Innovation Annual Report*, which is out now, showcases a year of record-breaking results for the horticulture industry.

With a \$5.60 return for every dollar spent on research and development (R&D), Hort Innovation says its \$158 million investment drove projects focused on sustainability, productivity and export growth.

Industry initiatives, such as the \$130 million Fresh and Secure Trade Alliance and groundbreaking tech adoption, underscore the value of these efforts.

Horticulture shows strong growth in the latest report from Hort Innovation.



Vertical farms continue to struggle say latest reports

Industry news journal *Hort Daily* has reported on the closure of another US vertical farm. Bowery Farming, a New York-based vertical farming business, has ceased operations of all its farms. The closure was confirmed by former employees but has not been confirmed by the company however its former Manhattan office was up for rent.

“Since its foundation back in 2015, the unicorn has secured over \$US700 million and employed over 500 employees,” reports *Hort Daily*. Financial problems have been affecting the business since 2023.

Bowery Farming supplied fresh produce to major retailers at more than 850 locations across the Northeast and Mid-Atlantic regions, including Whole Foods and Walmart, while also supporting local fresh produce for various food-delivery services.

Other players included Giant Food, Albertson's Companies such as ACME and Safeway stores, and Weis Markets. On top of that, the firm also supplied to e-commerce retailers such as Amazon and Hungryroot.

They produced five salad mixes, four lettuce and three herb varieties, New York-limited berries, three kits and formerly, retailer-bound Farmer's Selections.

Urban Ag in a report on the future of controlled environment agriculture in North America said that it should not all be seen as doom and gloom.



Vertical farms are expensive to build and operate and many have failed. Photo Adobe Photo Stock.

“There are still a few companies pushing forward on indoor farming. We are especially excited to see the longevity of companies such as Greener Roots and FarmBox Greens. Smaller vertical farms that are the right size for their markets have also shown the ability to be profitable. And we know others (like Area 2 Farms) with similar ideas can work. There are also larger vertical farms that are still very active. From Soli (USA) to Good Leaf (CAN).

“While questions remain on how big of an impact vertical farms will have on our food systems, there is a proven need for locally grown produce in specific markets,” says the report and concludes that vertical farms can service these markets if they are built and sized correctly with the right crops.

Another business opens

While one vertical farm business closes in the US, another opens. In late September US

company Plenty Unlimited Inc opened the world's first controlled environment facility to grow vertically farmed strawberries indoors at scale, year-round.

The farm, in Richmond, Virginia, is designed to produce more than 1.8 million kilograms of strawberries a year grown on 9m tall indoor towers. These in total occupy less than 3700m², which the company says is a fraction of the land that would be needed to grow the same amount of strawberries by traditional methods.

AI is employed to analyse more than 10 million data points each day across the 12 grow rooms in the new facility, adapting the environment in each to suit the evolving needs of the plants.

The first strawberries from the new facility are expected in 2025.

For more on vertical farming, see 'Last word' on page 42.

Better working conditions in greenhouses?

The latest research at Wageningen Plant Research in The Netherlands is assessing how to improve working conditions in greenhouses.

In a report on the work, it was noted that challenging greenhouse climates, increasing work pressure and more physically demanding work have made greenhouse horticulture less appealing as a working environment. The research project asks: "How can greenhouse employees work comfortably and safely?"

Anouk Leunissen and her colleagues at Wageningen hope to come up with some answers through their work with the Joyride Horticulture project.

"Technical developments in the greenhouse are good and certainly necessary. However, it is important to ensure that we do not forget the welfare of greenhouse employees," says Anouk.

Researchers started by looking at the greenhouse climate including high temperatures, high humidity and high radiation intensities that combine to create an uncomfortable working environment. One option looked at was an experiment to test cooling vests that employees can wear. The data is currently being analysed but already has shown up some issues.

Anouk explains: "We can already say that although cooling vests are perceived as cooler, there are issues in terms of how long the cooling vest stays cool. That is one to two

hours and condensation forms on the vest, which is experienced as unpleasant."

Researchers are also looking into other solutions, such as a portable small fan on the chest, or limiting the length of time spent in greenhouse sections where relative humidity is high.

Another issue that can arise on the work floor is communication.

"Because of the numerous nationalities working in a typical greenhouse horticulture company, communication both on the work floor and with management can be challenging," says Anouk. "We want to address this with a solution that can generate an automatic real-time translation using artificial intelligence. There are already certain earphones on the market that we want to test, particularly for technical jargon, because that remains a challenge for language databases."

The team still wants to explore the type of work and physical demands of working in greenhouses.

"Working in a greenhouse often involves repetitive actions performed in uncomfortable positions or is simply physically demanding," Anouk explains. "There are several aspects we could explore, like wearable sensors that trigger an alarm if a person repeats the same action a lot or using an exoskeleton to provide support for uncomfortable positions or physically demanding tasks."

Anouk Leunissen is asking for feedback on the project and ideas that can improve the working conditions of greenhouse employees. The Joyride Horticulture project continues until the end of 2026. Contact Anouk at <https://www.wur.nl/en/persons/anouk-leunissen.htm>



Anouk Leunissen at work at Wageningen Plant Research in The Netherlands.

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Tomatoes and mushrooms on the menu for astronauts

Continuing research into growing in space, a tomato variety developed to flower and fruit in space is blooming in the lab.

For more than five years, UCR has been working on the development of a tomato variety that is suitable to be grown in space. The plant needs to be compact in size but productive say the research team at the Plant Transformation Research Center at the University of California, Riverside.

The plan is to have tomato plants producing fruit in space in 2025.

Director, Dr Martha Orozco-Cardenas says having tomatoes in space is extremely valuable as they are rich in essential nutrient.

"In addition, tomatoes offer psychological benefits by enhancing mood and reducing stress through the sensory experience of fresh, flavourful food, providing comfort and a sense of normalcy in isolated environments like space."

Dr Orozco-Cardenas says tomatoes are also amenable to gene-editing techniques such as CRISPR-Cas9.

"These advances contribute significantly to crop improvement and broader plant biology research."

She says that the traits selected for space tomatoes will be valuable for commercial growers too.

As well as growing a modified tomato, the team is also discovering new ways to grow without sunlight.

Alternative energy source

Dr Robert Jinkerson, an Associate Professor of chemical and environmental engineering at the Bourns College of Engineering at UC Riverside is researching how to grow plants and fungal-based food using artificial photosynthesis.

"Our work is focused on how do we actually grow plants without light and try to reduce and minimise the amount of light," he said.

Instead of sunlight, Dr Jinkerson has managed to grow tomatoes using acetate, a carbon-base alternative energy source. Dr Jinkerson and his graduate students have successfully grown yeast, mushrooms, and green algae in the dark by feeding these organisms acetate.

Growing tomatoes and other crops in the dark with acetate, however, is proving to be more of a challenge because acetate is toxic to adult plants. Dr Jinkerson's team is homing in on solutions that involve mimicking metabolic processes found in germinating seeds. As seeds germinate, they can process acetate, but this mechanism shuts off as soon as the sprouts hit sunlight.

"We're basically trying to do engineering to turn on the metabolism that enables the adult



Yeast, mushrooms and green algae have been grown in the dark by feeding these organisms acetate.

plants to use the acetate," Dr Jinkerson said. "We're overexpressing key enzymes that give the plants more tolerance."

Mushrooms as well

In addition to tomatoes, the UC Riverside team is also working on the development of a system to grow edible mushrooms in space. Under the leadership of Associate Professor Jinkerson, the team won \$250,000 toward their research as a runner-up in NASA's Deep Space Food Challenge.

It is an international competition that started with about 200 teams of scientists to develop systems to produce food on the International Space Station. The proposed technology was limited to two cubic metres and could use no more than 1500 watts of electricity. The system is estimated to generate about 4000 calories per day.

Global survey of protected cropping

The results of an annual census of protected cropping (controlled environment agriculture), now in its fifth year, have been released. The research is conducted by CEAg World and Agritecture.

The results were shared by Henry Gordon-Smith, CEO and founder of Agritecture, during his opening keynote speech at the CEAg World Conference and Expo.

This year's survey looked in particular at technology and recorded responses from around 500 growers around the world. The key findings were that renewable energy is important to growers and that

growers are more concerned about infrastructure challenges and affordability when buying new tech.

In their responses 51 per cent of growers agreed that integrating renewable energy into their operation is very important. And while only 20.4 per cent of responses don't yet use renewable energy sources, 79.6 per cent of responses already use some form of renewable energy or plan to in the future.

Henry reported that most growers surveyed planned to increase their production area in the next 12-24 months and most are seeking solutions for the seeding, harvesting, and post-harvesting areas of their operations.



Henry Gordon Smith, founder of Agritecture.

The report also said it's important for all parts of the industry to work together.

"The more we work together, the more we're going to grow," said Henry Gordon-Smith. "We have a lot of challenges and need to collaborate in order to survive and to thrive. There's an art to sharing data without sharing anything that's confidential."

Farming in space

Growing crops in controlled environments in space, for example on the International Space Station, on the Moon, and on other planets such as Mars, continues to attract news coverage.

Research projects to enable food production beyond Earth also offer solutions for sustainable agriculture on Earth.

Wieger Wamelink (Wageningen University & Research) says space farming is not just about survival; it's about establishing a sustainable and efficient system to support life in space.

"It's much easier and safer to grow your own crops there than to constantly ship them from Earth," he explains adding that growing food on-site provides fresh produce, boosts astronaut well-being, and decreases reliance on Earth.

He also highlights another concern: "Astronauts always lose weight and one reason is that they don't like the food." The typical space diet consists of freeze-dried meals, which can lead to weight loss and diminished nutrition over time, posing an additional risk to astronauts' health.

Challenges

According to Wieger, space environments present extreme temperatures, lack of atmosphere, and harmful cosmic radiation. Additionally, resources like water and soil are limited, necessitating the use of hydroponic

systems. Extraterrestrial regoliths, such as lunar and Martian soil, contain toxic levels of heavy metals that pose risks to plants and humans. Ensuring a stable environment for plants, including proper light, temperature, and humidity, is also critical for successful space farming.

Recent breakthroughs in space farming technology are paving the way for successful extraterrestrial agriculture. Innovations such as radiation-shielding domes and advanced hydroponics systems are being developed to protect plants and optimise growth.

Wieger's research includes experimenting with crops such as potatoes and tomatoes

in simulated Martian and lunar soils, demonstrating promising results. These innovations not only support space missions but also offer new techniques for improving Earth-bound agriculture.

The B.A.S.E. (Bioregenerative Astrofood & Sustenance Engineering) project, led by Wieger Wamelink, is at the forefront of developing sustainable food systems for extreme conditions such as those on the Moon and Mars.

Creating a stable, closed-loop ecosystem that recycles waste into nutrients is vital for sustainable agriculture in those environments.



Dr Robert Jinkerson holds one of the compact tomatoes bred for growing in space developed in a US breeding program.

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Fertiliser prices falling slowly

Prices for the three major fertilisers used by Australian farmers – nitrogen, phosphates and potash – have gradually eased from the highs seen in 2022, following the sharp spike in global fertiliser prices with the outbreak of the Russia-Ukraine war.

And although prices remain high against historical levels, agribusiness banking specialist Rabobank expects muted global demand from across the fertiliser market to “seep into prices within the coming six months” with the weaker demand helping to offset global supply issues and keep fertiliser prices in a tight range.

However, the bank cautions in its *Semi-annual Global Fertiliser Outlook* report, global fertiliser markets are likely to remain volatile in the year ahead.

Report co-author RaboResearch agriculture analyst Paul Joules said fertiliser prices became extremely high, extremely quickly – but have begun to slowly flatten out.

“It has been like going up by escalator but coming down via the stairs in terms of the pace of the price correction,” he said.

Joules said Australian farmers are “hugely dependent” on other countries for fertiliser supply with very little of the chiefly used fertilisers manufactured locally.

“International supply and demand issues have a direct impact on Australian fertiliser



Paul Joules from RaboResearch says fertiliser prices are falling.

prices and ability to procure fertiliser,” he said. “As a relatively small player in the global buyer market Australia is not in a position to dictate prices.

Blue-banded bees for pollination in protected cropping systems



Blue-banded bee foraging in salvia.

In a Hort Frontiers project, Western Sydney University researchers are exploring the potential of blue-banded bees in protected cropping systems.

Among Australia’s diverse native bee species, blue-banded bees (*Amegilla* spp.) stand out as remarkable pollinators. Known for their striking blue/white bands and distinctive buzz, they are key pollinators of certain flowering plants. Unlike honeybees, *Amegilla*

vibrate their bodies at high frequency when feeding from flowers, causing pollen to be released from the flower’s anthers. This “buzz pollination” is particularly beneficial for solanaceous plants (for example eggplant and capsicum), some of which are currently pollinated by hand in greenhouses.

With so little known about these bees, understanding their role in pollination can offer valuable insights into their ecological significance and have broader implications for agriculture and biodiversity within food systems.

The researchers have successfully reared through two generations of *Amegilla* within a glasshouse system and maintained the population using supplementary feeding plants and sugar solutions. The next steps are to trial these energetic pollinators on significant crops and work towards building up larger, persistent managed populations.

If rearing techniques can be established and populations stabilised within protected cropping systems, similar pollination success might be achieved with *Amegilla* as is seen in Europe with bumblebees.

SOILLESS CALENDAR 2024/25

Check the event's website to monitor its current status.

DECEMBER

- 3-6 Australian Horticultural Trials Week,** Melbourne, VIC; horticulturaltrials.com
- 4 National Horticulture Roadshow, PCA Day,** Warrigal, VIC; protectedcropping.net.au

2025 FEBRUARY

- 5-7 Fruit Logistica, Berlin,** Germany; fruitnet.com
- 19-21 Greenlife Industry Australia Annual Conference 'Strong Together',** Brisbane Convention Centre, Southbank, QLD; greenlifeindustry.com.au

- 24-27 BerryQuest International,** Wrest Point Casino, Hobart, Tasmania; berries.net.au

MARCH

- 13-14 Fruitnet Berry Congress, Ahoy Convention Center,** Rotterdam, The Netherlands; fruitnet.com/berrycongress

APRIL

- 3-4 Fresh Produce India,** Mumbai, India; freshproduceindia.com

JULY

- 28-30 PCA 2025 Conference,** Adelaide Convention Centre, Adelaide, SA; pca2025.com

- 29-30 Fresh Produce Safety Symposium,** Novotel Sydney Brighton Beach, NSW; www.ifpss.com.au (or email events@fpssc-anz.com)

SEPTEMBER

- 7-8 JPFA International Symposium on Vertical Farming,** Tokyo, Japan (event to be confirmed)

If you are organising an industry event for March 2025 or beyond that you would like listed in the autumn 2025 issue of *Soilless Australia*, send the details to editor@protectedcropping.net.au

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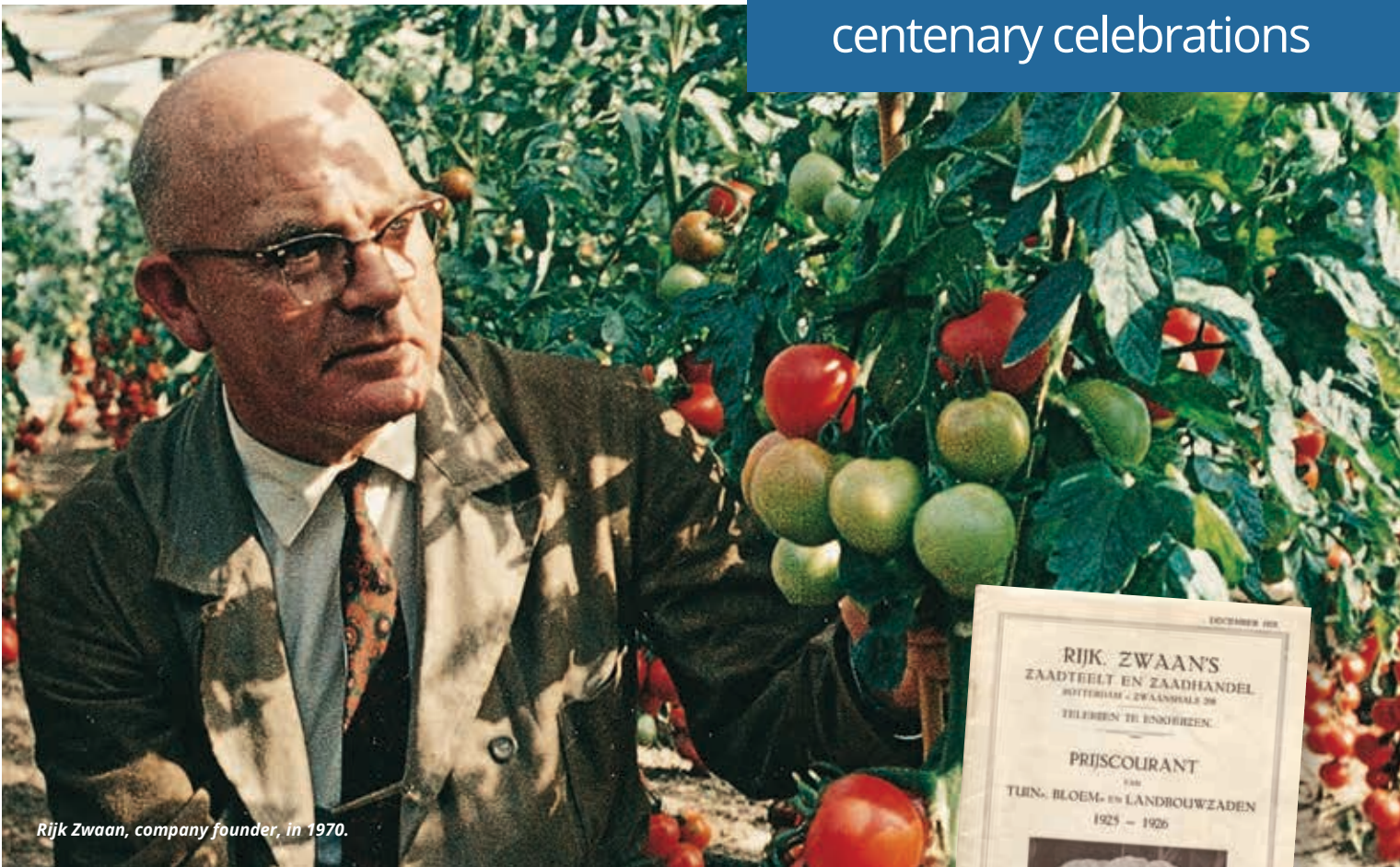
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Marking 100 years of growing

Rijk Zwaan is incredibly proud to celebrate a major milestone this year: 100 years of growth. Here the company shares its journey from a small seed shop that opened in 1924 to a worldwide seed breeding business.

Our journey began with Rijk Zwaan's vision to enhance the quality of vegetables while ensuring their accessibility and affordability for all. From a small seed shop in Rotterdam in The Netherlands in 1924, Rijk Zwaan is now represented worldwide, with 4000 employees continuing to uphold our founder's pioneering nature.

Through years of diligent research, hybridisation and selecting varieties with ideal characteristics, we introduce outstanding vegetables that continue to transform the way vegetables are grown and consumed.

Rijk Zwaan opened the doors of 'Rijk Zwaan's Zaadteelt en Zaadhandel', his seed cultivation and seed shop in the roaring '20s. Striving for higher quality seed and vegetables, he

soon began his own vegetable breeding operations.

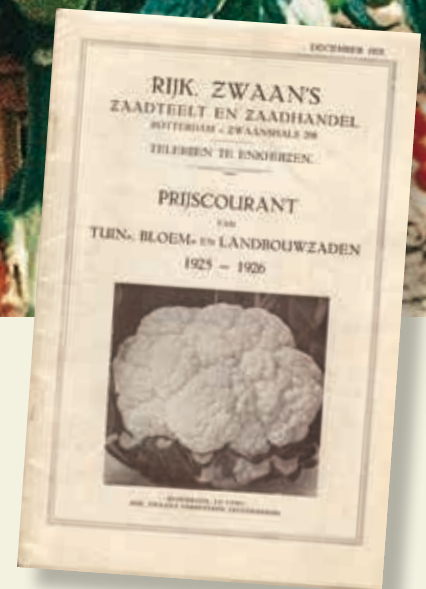
Rijk bred open-field vegetable crops, such as cauliflower, leeks, and carrots, as well as crops for indoor cultivation, even though large greenhouses were not yet common. The company pioneered this market in The Netherlands.

A global company

Rijk Zwaan's small 'Zaadteelt en Zaadhandel' has evolved and grown with the world. The company, now named after its founder, opened its first international office in Welver, Germany, in the mid-1960s, followed by offices in Spain and France and later beyond Europe. The Australian subsidiary was founded in 1987 in Daylesford, Victoria.

The Rijk Zwaan business model includes three phases:

1. Research and development (breeding programs, developing vegetable varieties);
2. Production (farming seed for research and for sale); and
3. Sales (getting the seed to growers).



Rijk Zwaan AT A GLANCE

35 independent subsidiaries in 31 countries.

Distributors in more than 100 countries.

Employing more than 3900 people.

Seeds for more than 25 crops.

1500 commercial varieties.

\$240 million invested in R&D each year.



“ANNUALLY, RIJK ZWAAN INVESTS 30 PER CENT OF ITS REVENUE – AROUND €150 MILLION (\$241,491,750) – BACK INTO R&D.”

Being an international seed company does not only mean providing vegetable growers with seed worldwide; it also means we can produce seed year-round. Counter-season seed production in Australia during Europe’s cold winters accelerates our research and helps meet global food demand.

Global locations help us select varieties that are suited to local growing conditions. No matter where they are grown, Rijk Zwaan seeds are sent to The Netherlands for quality control, which includes treatment, testing and distribution. Our rigorous quality control ensures only the highest quality seeds are available to growers.

Breeding programs

Sustainability and climate change are crucial aspects of our breeding programs. For open-field crops, we develop varieties that can better withstand extreme conditions, such as heat, cold, or salinity. Meanwhile, as indoor crop cultivation is increasingly moving towards high-tech production varieties that can help reduce energy inputs like heating, reduce labour costs and offer additional resistances are certainly hot topics. For example, the success of Alzamora RZ, the market-leading blocky capsicum variety in The Netherlands, is partly since it could be grown at one- or two-degrees cooler, without compromising on the number of kilograms of fruit produced.



A greenhouse with cabbages in Bergschenhoek, The Netherlands in 1925.

To help growers manage new pests and diseases, we have continuously developed tomato varieties with higher levels of resistance. Recently, we released new varieties that offer high resistance to the tomato brown rugose fruit virus. Additionally, plant structures are being adapted to facilitate easier twisting, improving crop maintenance and harvesting.

Hydroponics and substrate culture offers a sustainable model for production. It allows for better and more efficient use of labour and stable year-round production, improving food security. Ultimately, it’s about the stability, cleanliness, and certainty of the growing process. While lettuce, tomato and cucumber immediately come to mind when we talk about hydroponics, there is much more potential. In the US, we introduced the first spinach varieties for hydroponic systems in 2023. We have also held trials with radish, endive and other open-field crops. Melons, and our newest product category of berries, are also increasingly being grown indoors.

Technology

While plants evolve naturally in the wild, domesticated vegetable crops are influenced by plant breeders. By selecting and combining beneficial plant traits, such as yield, disease resistance, size, taste and texture, our plant breeders develop varieties that benefit the whole supply chain.

Every day, a large team works with lots of technology to develop new varieties. The time to market is crucial, so Rijk Zwaan uses all kinds of molecular techniques and data science to speed up the breeding process. We also conduct research in collaboration with universities and research institutes worldwide. Annually, Rijk Zwaan invests 30 per cent of its revenue – around €150 million (\$241,491,750) – back into R&D.

Market share

Rijk Zwaan holds a significant market share in cucumbers, ranging from long cucumbers to snack cucumbers. The sweet, pointed



A unique aspect of Rijk Zwaan is its family ownership.

The company’s independence has been a constant for its first 100 years and will continue to be so. In 1986, Jaap Zwaan sold Rijk Zwaan to BP Nutrition due to the lack of a family successor and the rise of biotechnology. BP sold the shares three years later, and in 1989, board members Anton van Doormalen, Ben Tax, and Maarten Zwaan bought them back with support from Cebeco-Handelsraad, restoring the company’s independence. By 2001, Rijk Zwaan became fully independent again when the three families repurchased the remaining shares from Cebeco with Rabobank’s financing. The company also introduced an employee share certificate scheme, which continues to this day.

Rijk Zwaan’s first store, Rotterdam, The Netherlands. This photo dates from 1926.



Key Pests

Biocontrol Solutions

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DIADEGMA

MOTHS (HELIOTHIS)



TRICHOGRAMMA

TWO SPOTTED MITE



PERSIMILIS



CALIFORNICUS



OCCIDENTALIS

WHITEFLY



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ERETMOCERUS



MONTDORENSIS



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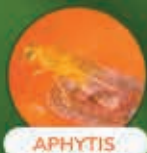


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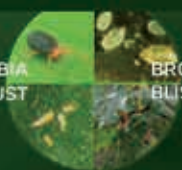
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CALIFORNICUS

Developing a new vegetable variety takes time, requiring between seven and 17 plant generations to achieve genetic stability, followed by testing and seed production, which depend on the seasons. On average, it takes 10 years to develop a new variety.



Sweet Palermo Yellow capsicum.

capsicum, Sweet Palermo, of which we sell multiple varieties, was recently planted on approximately 1000 hectares in Spain! We have also had long-standing success with cocktail and truss tomatoes. However, these products only account for half of our revenue since we have more than 1500 different varieties, including 500 in lettuce alone.

Future proofing

Looking ahead to the next 100 years, the

only way to future-proof a business is to grow. We see market potential in pumpkins, watermelons, asparagus, and berries. The berry category has grown tremendously over the past decade and Rijk Zwaan has recently started breeding programs for strawberries, raspberries, and blackberries. Our focus on berries is also driven by the shift from outdoor to indoor cultivation for year-round production.

We are not immune to market forces, and we

must address the labour issue, considering both availability and affordability. How can we develop varieties that require less labour? Crops such as lettuces and gherkins are already harvested mechanically, and various robotisation projects are underway in greenhouses for crop maintenance and the harvesting of tomatoes, peppers, and strawberries. It's not a matter of if, but when. Therefore, seed breeding companies need to develop varieties compatible with mechanisation.

Vegetable consumption

Lastly, the sector faces a significant challenge: convincing consumers to eat more fruit and vegetables. Ninety-six percent of Australians don't eat the recommended daily serves of vegetables.

We contribute by using Love My Salad and developing campaigns with value chain partners. Love My Salad is a social initiative of Rijk Zwaan coordinated by its employees together with growers, chefs, bloggers, health and nutrition experts from around the world.

As we celebrate a century of vegetable seed innovation, we remain dedicated to pioneering new solutions and pushing the boundaries of seed breeding. Our commitment to people, sustainability, and the quality of the fruit and vegetables grown from our seeds will continue to guide us on our journey of growth.



Beneficial insects being released on a crop at Daylesford in Victoria.





Understanding changes in weather and climate

While weather occupies our minds on a daily basis, it's climate change that's worrying Tom Remenyi, Director, Acclimatised, as he told a recent industry seminar in Tasmania.

"We often hear people talk about weather and climate as if it's the same thing but if you think about what they actually are, we use them in fundamentally different ways," Tom Remenyi explained.

He also urged attendees to trust climate science and believe that we are in a changing climate.

"We can predict climate change really really well, but we can't forecast the weather ahead with any accuracy," he said.

Weather forecasting relies on information from the daily, monthly and annual scales. At the moment, weather forecasts for up to seven days are fairly good but less accurate the further out we zoom he said.

"Seasonal forecasting is getting better, but it isn't there yet," he added. "It is not much better than climatology."

Climatology is basing forecasts on past records said Tom stressing that having confidence in climate drivers over the long term is needed improve longer term forecasts.

"There's a lot of certainty for temperature, less for rain but a lot of confidence around soil moisture," he said. "We are going to be in a different climate in the future and can make decisions based on being in that different climate. We know it is going to be 2C warmer at a global scale and we know that means it is

going to be approximately 4C on the land so we can see that our water needs will be that much higher, and we can start planning for that now. Calculating that isn't straightforward but we can start making longer term decisions now."

His message is that we need better understanding of the systems that effect our weather and how to incorporate them into our forward planning.

How the weather forecast comes to us

"Weather forecasts take observations from weather stations, satellites and from a bunch of other things and say what does the current system look like right now. It then incorporates all that information into a model, hits go and off we go," he explained. "There are many models – the weather bureau runs 100 different models every day so there are many outcomes. A forecast is only useful if it is better than what we know from climatology based on past records.

"The problem the Bureau has is that there are many answers as to what may happen tomorrow or in seven days' time, but the Bureau must select only one for a forecast. One of the models is probably right, but it may not be the model selected."

This means, growers must find metrics that are useful to them for better accuracy.

"We are not limited by our knowledge but by computational scale," he added explaining that AI and quantum computers will help improve the accuracy of forecasts.

"Models are getting better and better as we keep running them," he stated but it helps to understand how they work.

"A lot of models are run at 5km resolution but a weather event such as rain may happen on a 100m scale it may be inaccurate in one area but accurate nearby. That's why there's always a range of possibilities in the forecast, which is why the weather bureau gives a percentage possibility of rain for example based on the size of the grid cell.

"Storms are hard to forecast as they are small and high intensity and tiny changes in topography for example can affect outcomes."

An example of how new information is helping improve the accuracy of forecasts is a better understanding of CO₂ and its increase in the atmosphere.

"About five or six years ago weather forecasters around the world realised their accuracy was degrading as they weren't incorporating CO₂ in their forecasting. It was a missing component and one that was changing rapidly, incorporating it meant greater accuracy in the three-day and seven-day forecasts."

Tom says many other people will enter the forecasting space and tailor their information to special needs such as the wine industry. There are apps already in the space such as yr.no, which are using the same data that the Bureau is using to produce models that relate to Australia.

"Sometimes these are spot on and sometimes they aren't," he concluded.

Getting better seasonal forecasts

Like the weather forecast, seasonal forecasts use observations but look further into the future. A major factor is where we are sitting



"...WE NEED BETTER UNDERSTANDING OF THE SYSTEMS THAT EFFECT OUR WEATHER AND HOW TO INCORPORATE THEM INTO OUR FORWARD PLANNING."

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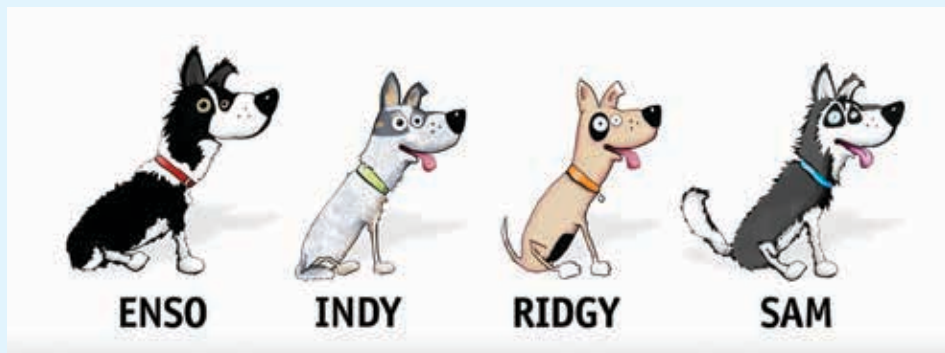
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Climatedogs and how humour helps in understand seasonal drivers



Dog graphics are used as a fun way to explain the main drivers of the Australian climate.

Enso represents the El Niño Southern Oscillation.

Climatedogs are six animated cartoon cattle dogs that are used to describe how different parts of the climate system interact with Australia to influence our weather.

The Climatedogs concept was developed by the Victorian Department of Primary Industries, New South Wales Department of Primary Industries and the Bureau of Meteorology to make something that's complex and difficult easier to understand.

The dogs star in a series of videos that explains how global climate processes vary their behaviour, potentially resulting in wetter or dryer seasons. The Climatedog characters are used to talk about climate forecasts and systems and how they might impact different parts of Australia.

When the dogs are working together, they bring rainfall to Australia but sometimes the dogs work against each other, scattering rainfall away from the continent and leaving it dry.

The five main dog characters are: Eastie, who represents the East Coast Low; Enso, who represents the El Niño Southern Oscillation; Indy, who represents the Indian Ocean Dipole; Sam, who represents the Southern Annular Mode; and Ridgy, who represents the Sub-tropical Ridge.

These 'dogs' herd our climate in different ways to affect rain and other climatic events. As well as the well-known five, there's a sixth Climatedog called Mojo who represents the Madden-Julian Oscillation.

in the cycles of the main climate drivers that affect Australia. Models that are used to forecast climate are at their most accurate when we are under the influence of one or other of the climate drivers and they can forecast when we'll shift back to 'normal'.

"Where we are in any climate cycle is also important for the accuracy of long-range forecasts," Tom explained. "They are not so good at forecasting when we are going

to shift under the influence of another climate driver."

He also introduced a system that throws a spanner in the works for forecasting.

"Importantly for seasonal forecasting, the whole atmospheric system of the globe has this thing called the May-June-July boundary. It is when the atmosphere gets incredibly chaotic and takes a while to return to normal. This timing is exactly when Australian

growers want a long-term forecast ahead of the growing season.

"It is the reality of the physics of our planet," he said adding that we will be able to understand this chaotic time in the future.

More information
Watch the Climatedog videos on the DPI websites for Victoria and New South Wales or see a general introduction on Youtube (<https://www.youtube.com/watch?v=OLWKKtBrQPc>).



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Meet Zak Iqbal

Jennifer Stackhouse caught up with PCA Board member Zak Iqbal to find him busy with his work as the Chair of the next PCA conference.

Q. What's your background with PCA?

Zak I joined PCA about five years ago as I was involved in the allied trade side of the industry and started attending conferences. I joined the Board about two years ago as I felt I wanted to give back to the industry and share what I know. I wanted to help the industry grow and connect with more people. I started as a Board Director then took over as interim Deputy Chair in 2023 and in January this year, I took on the role of Conference Chair for the 2025 PCA conference.

Q. That's a big job! Tell me more about the conference?

Zak Well, it is coming up in July 2025 and we are hard at work on the program. I am working with the executive team, the conference organisers and others to develop an interactive program for growers. We are very keen to create a conference that people can learn from and take back information to implement on their farm. Networking is what's important too as well as getting growers to connect with the allied trade. We are trying to find good reasons why people should come to the event and what they'll get out of it if they come.

Q. Your work introduced you to PCA initially, can you outline some details of your job?

Zak I have been in the industry as a business development manager in the protected cropping space for the past 20 years. I am an allied trader, working with many different companies and selling products to growers that they need to grow their crops. I am based in Brisbane and have now worked at Fernland for around five and a half years. My role is as a specialist in protected cropping.

Q. Can you share a bit about what keeps you busy each day – the challenges and highlights?

Zak I'll sum it up by saying I talk to customers, find their requirements in protected cropping and offer solutions. At Fernland we deal with a wide range of crops from berries through vegetables to medicinal cannabis, which is very exciting.



Zak Iqbal has taken on the role of Chair for the next PCA conference which will be held in July 2025.

Q. Do you feel the protected cropping industry is expanding?

Zak Fifteen years ago, it was a small industry but there's been a huge growth in the past two years. Right now though it is stabilising in its growth. Companies are getting bigger and bigger but there aren't a lot of new farms. Those that are here are now starting to specialise for example in new varieties.

Q. When you're not at work what do you like to do?

Zak Well I actually enjoy gardening and firing up the barbecue at home with the family. If I can get the time, then I like to go fishing or just picking up a good book.

Q. What are your thoughts on future for the protected cropping industry?

Zak There's lots on the horizon. AI is a long way away although there is a lot of robotics but there are still a lot of things in trial phase at the moment. What's being worked on now though will be in fruition in the next five to 10 years especially for harvest. Ultimately, I see a business that won't be so dependant on workers as we are today, which is vital.

Labour is a big issue for growers right now. They are competing with other industries for PALM scheme workers, and this is an issue as many other industries pay better leaving growers struggling to harvest their crops.

More new crops are also coming under protected cropping – look at trellis avocados under cover. They are small, manageable and easier to harvest than large trees in a paddock. Grapes, apples, pears and cherries are also coming under cover as they are all valuable crops. Coming under plastic reduces spoilage and allows harvest whatever the weather.

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Tracing the ToBRFV story in Australia

Tomato brown rugose fruit virus (ToBRFV) has been known in tomato and chilli crops in the Middle East since 2014 but in August 2024 was found in Australia. Jennifer Stackhouse traces the timeline and reveals how the story unfolded.

ToBRFV is a virus that attacks tomato, chilli and capsicum. It is highly contagious and can be found in both commercial and backyard crops. It has been spreading across the globe since 2014. It was first detected in the Middle East in 2014 and has since been reported in Europe, China, Mexico and the US.

While there is no cure at present, growers are learning how to manage the disease using strict hygiene and quarantine measures. Plant breeders are also developing resistant tomato varieties.

The disease is spread through all plant parts including seed and plant to plant contact and can be carried on clothes, hands, tools and equipment. The virus can survive in seeds, plant debris and contaminated soil for months. Some weeds, including black nightshade, silverleaf nightshade and buffalo bur are regarded as hosts. The disease can reduce marketable yields by 75 per cent. ToBRFV does not affect human health.



Symptoms of the disease on tomato fruit.

South Australia is a major production area for tomatoes accounting for 18 per cent of the nation's crop. The South Australian tomato sector is valued at \$179.8 million, producing 57,970 tonnes.

Timeline August to November 2024

AUGUST

- 19 ToBRFV was reported at two farms in South Australia. The farms are in the Virginia area north of Adelaide. The outbreak is the first time the disease has been reported in Australia. Following the discovery, the farms were quarantined, and surveillance and tracing began. PIRSA (Department of Primary Industries and Regions South Australia) began working with affected businesses to manage the outbreak and investigate the source of the outbreak, which was unknown. PIRSA also began working with other jurisdictions to trace any plant material from the properties that may have moved interstate.
- 23 New Zealand banned the import of all Australian tomatoes.
- 24 Queensland Government issued a movement control order (MCO) suspending the movement of tomato seeds, tomato seedlings, and tomato fruit into Queensland from South Australia.
- 25 More than 3100 plant samples were taken for testing from 18 businesses.
- 30 A further outbreak was discovered also in South Australia. This brought the number of affected farms to three.

SEPTEMBER

- 4 PCA webinar was held on managing ToBRFV (rewatch online via the PCA website). The webinar focussed on increased hygiene as an important way to control the spread of the disease.
- 6 New Caledonia National Plant Protection Organisation announced the suspension of tomatoes from South Australia. The suspension also covered the import of capsicum and chilli.
- 12 Western Australia put import requirements in place, blocking potential carriers of ToBRFV that are grown and packed in a state or territory where ToBRFV is known to occur. Host material exported to WA before that date was exempt, provided evidence is provided to verify the export date. These consignments will be inspected upon arrival for pests and diseases exotic to WA.
- 17 New South Wales put a control order in place to prevent the movement of risk items, including tomatoes, capsicums and chillies from infested properties into the states. Restrictions, including testing and surveillance, are required from properties that are linked to infested properties. Unlinked properties can continue to trade as normal.
- 23 Western Australia extended import restrictions to include all potential ToBRFV carriers from any state where the virus has been found, with South Australia being the only confirmed location.



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Identification on leaves and fruit

Symptoms of ToBRFV virus can look like those of other viruses from the same family and only laboratory tests can confirm it. Different plant varieties can present different symptoms.

What to look for on leaves:

- mosaic or mottling patterns
- yellowing or discolouration
- blister-like appearance on the top surface of leaves
- deformities, including smaller leaf sizes.

What to look for on fruit:

- yellow patches and marbling
- brown wrinkled spots on fruit
- uneven ripening (including green stripes or blotches)
- deformities.



ToBRFV affects all parts of the tomato plant: (a, d) brown rugose symptoms developed on fruits; (b, c) yellow spots on fruits; (a, e-g) mosaic pattern developed on leaves and narrowing accompanied by mottling leaves; and (g) necrotic symptoms on pedicel, calyxes, and petioles. Aviv Dombrovsky and Elisheva Smith, CC BY 3.0 <<https://creativecommons.org/licenses/by/3.0/>>, via Wikimedia Commons.

26 Australian Government announces that it is working closely with the South Australian Government to support tomato industry workers stood down due to the impacts of tomato brown rugose fruit virus, and ensuring their financial wellbeing is a priority in what is a difficult time for them and their families.

30 PIRSA set an Assistance Hub at the Virginia Horticulture Centre to provide support to the businesses and workers adversely affected by the virus, offering access to financial, counselling, and redeployment services.

OCTOBER

1 Tasmania put in place a control order to prevent the movement of risk items, including tomatoes, capsicums and chillies, into Tasmania from infected properties. Restrictions, including testing and surveillance, are required from properties that are linked to infected properties. Unlinked properties can continue to trade as normal.

1 Food Standards Australia New Zealand (FSANZ) assure the public of the safety of consuming tomatoes. FSANZ CEO Dr Sandra Cuthbert said the virus poses no food safety risk and consumers can continue to eat tomatoes and other produce with confidence.

NOVEMBER

4 Nearly 4000 plant samples have been taken for testing from 33 properties. At this time, 17 properties were advised that their results showed that ToBRFV was "not detected".

11 PCA circulated exporting guide for tomatoes, capsicum and chillies from SA to WA and QLD. Guidelines involve an application. Fruit for export must be sampled 10 days before harvest (at no charge to the grower) for a Plant Health Certificate. The fruit can be harvested while awaiting approval to export. The information is available in several languages.

14 Three months after the initial outbreak, no further outbreaks have been reported. Harry Kapiris of Gawler River Tomatoes who faced a substantial loss from the disease is reported that he had destroyed around \$1.1 million worth of tomatoes and lost 30 workers. He attributed the outbreak to potential biosecurity lapses with imported seedlings.



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Applying the wet stuff

While irrigation systems can vary in size and complexity, all systems rely on some form of start trigger says Tony Bundock.

The ultimate goal with any irrigation system should be to provide your crop with the correct amount of nutrient-rich water to avoid any form of stress to the plants.

But what options are available to assist in this process? In simple terms, there are several ways but ultimately the chosen system is effectively driven by the grower's interpretation of the crop's needs.

Irrigation strategies are driven by basic guidelines to achieve uniformity in the crop and provide adequate supplies of water to the plants. In general terms irrigation is not applied to a crop until one hour after sunrise. This is to encourage the plants to become active and seek water from the growing media via the root zone. Once the plants start transpiring, they need to replenish the water that is lost through the stomata in the leaves, and this is achieved by water uptake from the root zone.

When irrigation commences, the general aim is to get the moisture content in the growing media elevated to a pre-determined point when drain starts to appear from the growing media. After this, irrigation is generally applied to maintain a moisture content with a nominal drain percentage, until a set point is reached when irrigation ceases and allows the growing media to dry out to a predetermined level. Ideally the dry down results in the moisture content of the growing media being the same level as the previous day. This is highlighted in simple terms in Figure 1.

Why is there a need for drain? As can be seen in Figure 1, the EC in the growing

media can start to rise as nutrient-rich water is applied. Irrigating to a frequency where the growing media is saturated causes the excess water to run to drain and effectively reduces EC levels. Having said that, an elevated EC level may be the aim of the grower to impart a more generative action to the plants, but managing the drain is a tool the grower can utilise.

How much water?

How much water should be applied in each irrigation event? Think of your growing media as a sponge. If you apply small volumes of water frequently growing media absorbs the water evenly. If you apply large volumes of water each time you irrigate, a large percentage of that water just runs freely to drain.

With drip irrigation systems, the volume of water applied depends on the duration of the irrigation event and the dripper size utilised in the system. For example, if you have nominally rated 3 litre per hour drippers in your system, and these are allowed to run for two minutes, then a total of 100ml of 'gift' water will be delivered from each dripper. Conversely if you have nominally rated 2 litre per hour drippers, they need to run for 3 minutes to generate a 100ml gift value. It is up to the grower as to how much water is applied in each irrigation event, but if you use a standard gift value then you only have to look at varying the application times to change to overall moisture content of the growing media.

So how can irrigation be triggered to give the correct moisture content? Probably the simplest system is for a grower to trigger irrigation manually. The decision as to when and how much irrigation is needed can be a direct result of the grower deciding when the crop needs to be irrigated. But while this all

sounds ideal, triggering irrigation manually is highly dependent on manual labour – and most of us don't have the time to be in a greenhouse seven days a week, 12 hours a day!

Using a simple timer provides irrigation at predetermined times. This can see the initial irrigation event being delivered at the nominal one hour after sunrise, and then repeated to elevate the overall moisture content of the growing media. The irrigation events can be set to be more frequent until a predetermined time when drain should be seen, and then reduced in frequency during the day, before ceasing at the end of the irrigation period.

The problem with irrigating on time is that the irrigation system will run regardless of climatic conditions. So, while your preset times might be ideal for a sunny day, they will be excessive for an overcast or rainy day.

A better method is to utilise a system that is driven by sunlight, which by default reflects weather conditions. There are a number of control systems on the market that do this and while they may not be cheap initially, remember that this is just like having a staff member totally dedicated to controlling irrigation 24/7. In essence it equals a fairly cheap labour source that doesn't need holidays/sick pay/ time off!

Automated systems generally respond to sunlight in the form of joules/cm². This value of light is measured from an external weather station on the farm. Over a daylight period, joules are measured in a cumulative format. So initially 1 joule is registered, and when the next joule is measured then this equals 2 joules and so on. Radiation values in watts/m² can also be used to trigger irrigation but these are not generally registered as a cumulative value.

The grower can then set up the irrigation strategy to trigger irrigation events more frequently at the start of the day, and then increase the value of joules to give irrigation events spaced further apart.

In the example shown in Figure 3, the joule value to be reached between 7:25am and 9:00am is 65. This is followed by a joule value of 72 up to 11am followed by larger values which would see less frequent irrigation triggering.

So that's all good while the sun is shining but what happens if we now have a rainy day with minimal light? In general terms greenhouses are enclosed environments with elevated temperatures to the outside and our plants will still be transpiring. This is where the maximum rest setting comes into play. The maximum rest time is a set period of time that if reached (and the nominal level of radiation sum is not realised within that time frame) will trigger an irrigation event. So

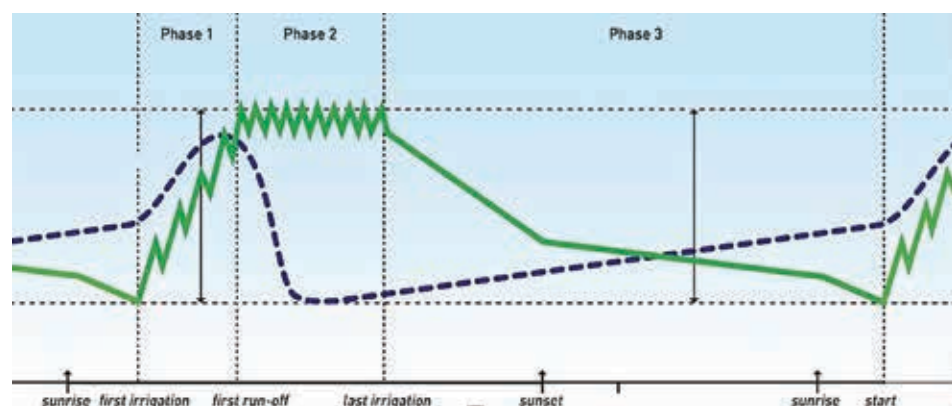


Figure 1 The day dynamic WC and EC graphic (WC+ EC Strategy).

“IF YOU APPLY LARGE VOLUMES OF WATER EACH TIME YOU IRRIGATE, A LARGE PERCENTAGE OF THAT WATER JUST RUNS FREELY TO DRAIN.”

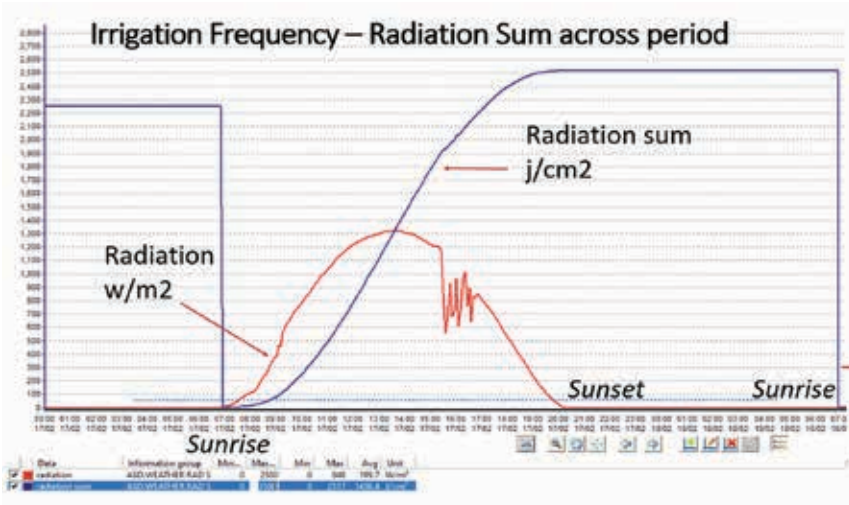


Figure 2 Graph showing radiation in joules and watts over a 24-hour period.

Start strategy

1	Automatic/manual start	YES	NO						
2	Period	Per1	Per2	Per3	Per4	Per5	Per6	Per7	Per8
3	Activated	NO	NO	YES	NO	NO	NO	NO	NO
4	Period	ON	ON	ON	ON	ON	ON	OFF	OFF
5	Start time	7:23	9:00	11:00	14:00	17:30	18:30		
6	Start phase	PHASE 1	PHASE 1	PHASE 1	PHASE 1	PHASE 1	PHASE 1		
7	Minimum rest time	0:05	0:05	0:05	0:05	0:05	0:05		
8	Maximum rest time	1:00	1:50	2:00	2:50	1:00			
16	Radiation sum start	65	72	83	125	250			

Figure 3 Irrigation frequency – radiation sum and time.

basically, it is a safety valve for the system. If, however, the radiation level is realised within the nominal maximum rest time, irrigation occurs and the maximum rest time resets and starts counting down again.

So, what is a minimum rest time setting? This is a value of time that can be set to basically stop irrigation events happening too quickly. With drip irrigation, if irrigation is triggered too frequently it can lead to water finding the path of least resistance in the growing media causing ‘channeling’ in the media. This effectively sees water running straight to drain. The minimum rest period prevents irrigation events triggering in quick succession and causing the channeling effect.

This all sounds great for an enclosed growing structure, but what happens if I’m growing in open ended tunnels and the plants are subjected to wind and increased transpiration levels? Well, that’s the next part of the story, which we’ll look at in the Autumn 2025 of Nitty Gritty!

Tony Bundock is PCA’s Project Manager. He is happy to answer questions about protected cropping. Email questions to editor@protectedcropping.net.au.

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Biobest Academy fills the knowledge gap for ToBRFV

There's a thirst for current information on managing the new virus that is threatening Australia's tomato and capsicum crops. Stephanus Malherbe reports on a new course to help understand and manage the virus.

Amid the recent outbreak of tomato brown rugose fruit virus (ToBRFV) in South Australia, farmers and advisers rushed to access the most up-to-date information. According to Google Trends, the search term "Tomato Brown Rugose Fruit Virus" was used 174 times in Australia two days following the official press release on August 19.

Sifting through all the websites and technical sheets can be daunting, confusing and time-consuming. Government departments and industry stakeholders provided one-page summaries that contained only general information, but growers needed practical insights gleaned from real-world experiences.

The Biobest Academy aims to overcome this challenge. Neal Ward, Biobest Academy Manager explains: "Our initial focus was to build a valuable, easily accessible resource for our technical teams, helping ensure we give the very best advice to growers."

However, Biobest Academy is now available to stakeholders and interested parties outside of Biobest he explains.

"We are happy to announce that the 'Tomato Brown Rugose Fruit Virus' course is now available on the Biobest Academy website," says Neal said. The course, which costs around \$20 to undertake, can be accessed at <https://biobestacademy.learnapon.com/store>.

Range of courses available

The Biobest Academy is the first globally accessible online learning platform for all things related to Integrated Pest

Management (IPM) in protected crops. A panel of international subject-matter experts write all the modules.

"Whether it is learning to identify key pests and diseases in your crop, understanding the complex biology of aphid hyperparasitism, or getting to grips with cutting-edge cannabis growing techniques, the Biobest Academy has a course for you," Neal says.

Introductory courses cater for beginners while complex courses provide a challenge for advanced users. The courses are also ideal for training remote teams where in-person visits are impossible due to distance or biosecurity concerns.

They cover basic crop agronomy and the IPM strategies for managing the key pests and diseases of capsicums (peppers), cucumbers, medicinal cannabis, strawberries and tomatoes. Efforts are underway to expand the crop range to berry fruits and cut flowers.

English is the primary tuition language but some of the courses are available in Dutch, French, Spanish, Turkish, and Greek. More than 50 courses are currently available on the website. Students earn a downloadable certificate after passing a short exam. In the UK, the courses qualify for BASIS professional development points.

The Biobest Academy plays an important role in training and improving the knowledge of new and current employees of Biobest and its subsidiaries.

Biological Services experiences

Biological Services consultants are on a learning path towards becoming Certified Biobest Advisers. We believe Biobest Academy is the ideal starting point for any new team member, especially at the large greenhouse facilities.

Growers with large teams can use the

Course details and contacts

There are small charges for most of the detailed courses, however, not all courses are paid. The course on the website called 'Effective Scouting', is free! New courses are added regularly while webinars are presented throughout the year.

To sign up for the Biobest Academy, visit <https://biobestacademy.learnapon.com/store>.

Biobest Academy courses to get everyone on the same level.

The courses are practical and relevant to current and developing trends. For example, Cezar Moraes, the Biological Services Team Leader in Western Australia, contributed to the course on chilli thrips (*Schirtothrips dorsalis*).

"It is good to know others can benefit from our experiences in Australia when dealing with this difficult pest," Cezar said.

Anita Marquart, the Biological Services Team Leader in South Australia, deals with the fallout from the ToBRFV outbreak daily.

"The ToBRFV course contains good photographs and practical management tips," says Anita. "It is a fantastic resource. I wish all our growers had access to it."

Stephanus Malherbe is IPM Product Development Specialist at Biological Services. He is based in South Australia. SA



Some of the pages from the new online course about ToBRFV.



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*The distinctive walk of a looper caterpillar.
Photo Adobe Photo Stock.*



A look at the 'Flutterins' and their caterpillars

Ion Staunton catches up with butterflies and caterpillars and outlines their lifecycle and control.

In all the years I've been writing for this magazine, I haven't written about the lepidopterans – the moths, butterflies and their hungry larvae...caterpillars. Why?

Protected cropping usually means walls and therefore fewer significant invasions from this group. But it happens of course; walls aren't always in place and the fluttering adults have sensory equipment and the dominating goal to lay eggs on plants that are full of life and tasty juices. For them navigating an open

doorway is a breeze. Getting inside away from birds may also have a bit to do with your occasional need to know some basic stuff on the insect order Lepidoptera. Here's the simple version.

Lifecycle at a glance

Lepidoptera eggs can be laid singly or in batches on the plant. Caterpillars hatch a few days later and immediately start eating and moving around the plant. During the day, the larger ones can be down among the lower foliage (instinctively away from birds?). All have mandibles or chewing mouthparts, low and frontal on the head capsule. They have

six stomata that are simple eyes but seem unable to detect much more than light and dark. On the thorax, just behind the head, are three pairs of legs with joints and tarsi (feet) then there's a gap until the rear-end prolegs, which are not proper legs.

Loopers have two pairs of well-developed prolegs toward the end of the abdomen and another pair on the almost last segment so that as they 'walk' they transfer weight to the front legs, bringing their prolegs up to get a grip close behind the real legs then raise the rest of their body to reach ahead, which is why loopers are sometimes called 'inchworms'.

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Regular caterpillars have four sets of prolegs (and a rear pair) and 'walk' in an undulating motion. Along the sides, including both thorax and abdomen, the larvae have breathing 'holes' called spiracles, usually vertically oval and maybe a different colour to the body. Some caterpillars have defensive hairs or even spines or spikes, which are distasteful to birds (they hope). Armyworms 'march' a few abreast in columns that may appear intimidating to some predators, but many birds think it's wonderful to have so many to eat in one place.

When nearly fully fed/fully grown, most caterpillars go to the lower stems and may be heading for your trusses, benches, or framework where they do one of two things: become a chrysalis (butterflies) or a cocoon (moths). A chrysalis is often a brightly coloured capsule hanging by a 'thread'; cocoons are elongated and often protectively hairy, hanging or hiding in grooves, curled leaves or in the bark. This is often where overwintering occurs.

There are two easy-to-notice differences to identify adult butterflies (wings held vertically at rest/club on the end of a thin antennae) and moths (wings roofwise at rest and many antennae variations but not clubbed). From



Cocoons of a parasitic wasp and the remains of a parasitised caterpillar. Photo Adobe Photo Stock



Caterpillar.
Drawing Ion Staunton.

a distance you can notice that butterflies are more erratic in the air than moths and moths fly more evenly. Both have their wings covered in overlapping scales. Lepidoptera is Latin for scaled (lepido) wings (ptera).

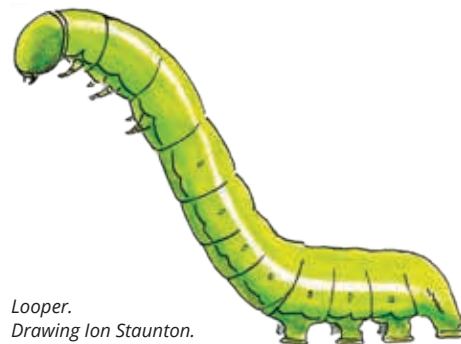
Now you know the basics!

Principals of control

Biological control involves the use of predators, parasites or anything that is natural. Slow-moving caterpillars are easy targets for wasps but there are praying mantids, assassin and other bugs, birds and other friends that can either eat them whole, suck them dry or lay eggs inside them as some wasps like to do.

It is a population control scenario. For instance, you need at least a small population of the pest to attract and sustain predators and parasites. If the lifecycle of the pest is only a couple of weeks, the pest population can grow faster than the control agents and damage increases. However, in protected cropping situations, there is less chance of a swarm-sized invasion of pests and so introduced biological control agents work a treat.

Insecticides differ in their action and are either systemic or contact. Systemics are absorbed by the plant and circulate throughout the sap stream. Any insect that eats leaves, buds, flowers, fruit or stems after an application will die. Contact insecticides need to contact the insect to be effective. They may be either residual (lasting many weeks) or have as little as a one-day residual



Looper.
Drawing Ion Staunton.

life. The plant keeps growing, but the residue stays where it landed and pests are usually more interested in new growth and so, a couple of weeks later they're not standing on the residue.

Non-residual contact killers can be applied right up until harvest to eliminate every pest you can hit with a droplet meaning no pests and no residues on your produce as you harvest. The non-residual contact insecticides can also eliminate pests at any stage for example when the population gets a bit too high before you notice and you'd like to introduce biologicals for the rest of the crop's life. A few days after regaining control and when there are a few recently hatched pests or newly laid eggs but no residues, the biologicals have an even start getting and maintaining control.

Ion Staunton is the entomologist at Pestech.com.au, the manufacturers of Py-Bo Natural Pyrethrum Concentrate. Phone 1800 123 457 for more information or to find your nearest reseller.

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Brown marmorated stink bug seasonal updates

AUSVEG has released a seasonal update for brown marmorated stink bug (BMSB) including new risks for the upcoming season. BMSB is an exotic pest that could find its way into Australia.

China and the Republic of Korea have been added to the heightened vessel monitoring list, which now covers goods arriving from 39 countries. The updates also introduce AusTreat, for offshore providers. AusTreat, which has been introduced this year, is a new pre-border biosecurity treatment provider scheme. AusTreat has replaced the Offshore BMSB Treatment Providers Scheme and sets the conditions for the regulation of pre-border biosecurity treatment providers.

AusTreat increases DAFF's coverage and flexibility in responding to biosecurity risk through increased assurance of offshore treatments, reducing intervention at the border

and eliminating the need to develop new pest specific schemes.

About BMSB

Brown marmorated stink bug is considered a 'hitchhiker' pest, often arriving in goods shipped from countries where it is already found. When seeking shelter, especially during winter, they can find their way into goods awaiting shipment. They have been detected in a large range of cargo including machinery, vehicles and personal luggage.

BMSB, which resembles some native stink bugs, feeds on fruits and vegetables and could cause major damage to agricultural crops, nursery stock and ornamental plants. It is also a public nuisance pest. During the colder months, it seeks shelter inside homes, buildings, vehicles, machinery and sheds. When disturbed or squashed it releases a smelly odour giving it the name 'stink bug'.

Potentially affected plant industries are notified of detections through the Consultative Committee on Emergency Plant Pests (CCEPP).



Halyomorpha halys— brown marmorated stink bug

Exotic to Australia

Exotic to Australia; native to China, Japan, Taiwan, Korea; introduced to USA, Canada and Europe.

Adult—key distinguishing features:
Size: 12-17 mm long.

Colour: brown; body with variable (shading, generally brown or ash-brown, reddish brown, greyish-tan, or brownish yellow; white banding on the last two antennal segments, small clusters of green spines on or near the head, appearing more distinct on ventral surfaces); black and white banding around rear edge of body; underside of body is generally pale yellow, sometimes with grey or black markings.

Structure: shield-shaped body; head fairly rectangular, and relatively broad and blunt across the front, when folded the wings do not completely cover the outside edges of the abdomen.

Adult—diagnostic information:

Colour: variable; generally brown or ash-brown, reddish brown, greyish-tan, or brownish yellow; femur tips (lower jointed with dark spots, with the scutum reddish), spots may be rusty or green in some areas; antennal segments brown with segments 1 a tertiary, 6 at the base and apex, and 7 at the base and apex marked with black; coracials with banded pattern, pale cross-veins shaped in central third of exposed tergites, with a very thin pale line also present along distal edge of segments; body ventrally generally pale yellow.

Structure: legs normally pubescent; rest of body glabrous.

Head: generally rectangular, front blunt above at most, with jugae evenly obtuse, jugae nearly or as long as tylus.

Antennae: 5-segmented.

Pectus: reaches abdominal sternite 3.

Pronotum: calli present; anterolateral lobe gas straight and well-developed.

Phenolic resin: prothoracic flat to shallowly convex; mesothoracic with low raised base; metathoracic flat.

Common: exposed foliar/terrestrial arched with very short blunt posteriorly directed angles.

Immature—key distinguishing features:
Size: 2-4-12 mm long.

Colour: abdomen orange and red with black stripes, becoming darker with age, shading on legs and antennae appear as white spines.

Structure: similar to adults but without wings (see Figures 2, 3 & 4); a pair of spines of small white spines may be present around edge of thorax.

FIGURE 5 *Halyomorpha halys*. A: dorsum, B: ventral (Quarantine Insect: 5/11/23)

SCALE BAR = 2mm

Department of Agriculture, Fisheries and Forestry Guide to the identification of brown marmorated stink bug, *Halyomorpha halys*, and other similar bugs.

Pictured, (top right) - Adult brown marmorated stink bug feeding on green beans. Photo Tim Hays; (right) BMSB id chart comparing the exotic pest with other bugs.



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New strawberry variety combats disease issues

‘Stella’ the new Australian-bred commercial strawberry is good news for strawberry growers in the subtropics. That was the message from the recent Australasian Plant Genetics presentation in November.

Adrian Schulz told the meeting in Queensland, which was also broadcast via Zoom, that the 2024 strawberry season in Queensland was not good due to a wet summer. The wet conditions made preparation, planting and growing difficult. It also affected the production of runners and plugs with many growers receiving propagation material late in the season.

One of the biggest issues for growers in 2024 was bud and leaf nematode, which led to an estimated \$50 million in losses. Red leaf disorder is also an issue for growers and affects the strawberry variety and industry leader and benchmark, ‘Red Rhapsody’.

‘Stella - ASBP’ (to give the fruit its official name) was produced from a breeding program headed by Dr Jodi Neal, DAF’s



Dr Jodi Neal (left) with Berries Australia CEO Rachel Mackenzie and Brett Fifield, CEO at Hort Innovation, at the launch of the Aussie-bred strawberry, ‘Stella’. Photo Ashley Walmsley.

Principal strawberry breeder. The variety has proved itself to be a disease-resistant plant with resistance to red leaf disease and moderate tolerance to fusarium. The variety was released at the Brisbane Ekka in August.

‘Stella’ is named for the late Stella Young, an advocate for people with disabilities, a journalist and comedian, who died in 2014.

In addition to its disease resistance, the variety was selected from the breeding program for its beautiful flavour and attractive bright red fruit. It also has a high yield and large fruit size, which makes it more cost-effective for strawberry farmers to grow.

Breeding is also underway for temperate varieties with some ready for release said Dr Neal.

What’s in a name?

As well as paying tribute to Stella Young, the strawberry breeding program is acknowledging other achievers. In recent years, the Australian Strawberry Breeding Program has named its new varieties after accomplished, talented, and remarkable Australians says Dr Jodi Neal. Those honoured include Olympic athletes Susie O’Neill and Tahli Gill, and renowned classical pianist Tamara-Anna Cislowska.

“Stella Young was fierce and funny. She stood up for people whose bodies looked different or performed differently. She was a voice for people living with disabilities, and what she had to say is important for everyone to hear,” said Dr Neal at the launch of the new ‘Stella’ strawberry.

Biodiversity plantings to combat pests in The Netherlands

In this year’s Northern Hemisphere autumn, 20 horticultural companies received a biodiversity strip.

The strips were planted next to selected greenhouses in The Netherlands. They consist of a carefully selected combination of annual, biennial and perennial plants, which have been planted with the aim of exploiting the likely benefits for natural enemies of greenhouse pests.

According to Glastuinbouw Nederland, an entrepreneurial network in the Dutch greenhouse horticulture sector that is coordinating the work), the study will compare and test two different mixtures during the next two years.

The project is being carried out by Wageningen University and Research

in collaboration with Leiden University. The main objective is to promote insect biodiversity while also improving greenhouse pest control.

The 20 locations were selected from almost 50 interested companies. The sites were assessed and prepared. The biodiversity strips, each 250 square metre in size, were laid out in October and November. In the coming years, intensive monitoring will take place from May to the end of August to measure the effects of the biodiversity strips on pest pressure and populations of natural enemies inside and outside the greenhouses.

Various monitoring techniques will be used for this purpose to accurately track insect populations. The project has been funded by Dutch companies, foundations and municipalities.



A biodiversity strip growing beside a Dutch glasshouse.

Andrew McIlwain leaves Green Camel

After more than five years of running the glasshouses at Green Camel in New South Wales, Andrew McIlwain has said he is stepping down.

Andrew, who is Deputy Chair of PCA and a member of the Industry Advisory Council, was General Manager of Green Camel. He announced on LinkedIn that he was making this career change and wished the business well. Some of his many achievements include launching three new organic lines into supermarkets and increasing the production area from 0.4ha to 2.7ha.

Andrew has received important awards including Grower of the Year in 2022 (a PCA award) and Young Organic Leader of the Year in 2022 (an Australian Organic award).

He has confirmed that he will stay on the PCA Board and continue working with the protected cropping industry. For now though he is planning on taking off some time with friends and family.



Andrew McIlwain.

Information on hiring overseas workers

The Department of Home Affairs has dedicated Business, Industry, and Regional Outreach (BIRO) officers to provide information on migration to businesses wanting to hire overseas workers.

The Employer Hub page is now live with information on the different types of visas, the skilled occupation list, sponsorship and the steps for hiring overseas workers, checking visa holder work rights, understanding employer responsibilities, and a contact form for connecting with the BIRO network.

To see the page, visit the website of the DHA (homeaffairs.gov.au) and follow the links for visas.

Closing the recycling loop



The teams from drumMaster and Pact Group announcing the new recycling project.

In an Australian first, drumMUSTER, in collaboration with Pact Group, has begun recycling used chemical drums into new ones.

Pact has started manufacturing plastic agricultural chemical drums with up to 30 per cent recycled material derived from used containers collected through drumMUSTER, creating a circular solution for millions of plastic agricultural chemical containers.

This innovative approach not only reduces waste but also conserves resources by creating a sustainable cycle of use and reuse. Pact aims to collect, recycle and remake nearly a million plastic agricultural chemical drums each year using material derived from drumMUSTER, creating a circular solution for plastic agricultural chemical containers.

The drumMUSTER program will continue to operate as it has for the past two decades, with no changes to the collection and recycling process.

Successful trial of new harvesting robot

Robot development company inaho Europe (a subsidiary of Japanese company inaho) has been trialling its snack tomato harvesting robot for loose cherry tomatoes in The Netherlands.

Trials with the robot and Dutch growers started in May 2023. The company's website reports improved harvesting speed, fewer mistakes and a more practical body with the latest robot on trial.

Compared to last year, the robot has doubled its harvesting speed in similar conditions, thanks to a new chip, new camera and improved AI software.

Improved image recognition has decreased the number of errors associated with dropping tomatoes and picking green ones. The robot's body has been slimmed down by approximately 17 per cent, making it more practical in the greenhouse for avoiding damage to the plants and fitting smaller lanes.

Inaho's COO, Sohya Ohyama, is keen to continue working with European growers.

"We want to expand the scales of our trials to get ready for commercialising our robots and we are actively looking for some growers with a clear vision for the future.

"Growers can take advantage of becoming familiar with collaborative operations with robots at an early stage and getting ready



The inaho robot at work harvesting snacking tomatoes in a Dutch glasshouse.

for rising labour costs and labour shortages. We are willing to work together with growers to develop a concrete business model and robot arrangements to maximise the co-performance between humans and the robots."

Importance of Korea and Australia trade highlighted

Korea is Australia's third largest trading partner and Australia ranks sixth for Korea. The relationship between the two countries was celebrated at the 45th Australia-Korea Business Council Joint Meeting in Perth in September.

The event talked about recent advancements in the bilateral relationship between Australia and Korea and celebrated the 10-year anniversary of the signing of the Korea-Australia Free Trade Agreement.

GreenPlus CEO and Managing Director Steve Kim took part in a panel discussion on 'Innovation in Traditional Industries'. During the discussion, he emphasised the critical importance of food security and the need for a collaborative approach.

He says Korea's industrial capability offers significant advantages that Australia can

leverage, while Australia's vast land, green energy resources, and academic expertise are key to sustainable food production.

GreenPlus Australia used the event to showcase the advancements in glasshouse production and the company's efforts to bring the tech to Australia. As well, GreenPlus is working with Korean green energy technology providers to design circular economy and green energy projects, which it also aims to roll out in Australia.

There are numerous opportunities for green energy technologies between Australia and Korea, which can offer alternative solutions to global greenhouse challenges and carbon capture technologies that can greatly reduce operational costs in food production. GreenPlus Australia says the company is committed to accelerating the protected cropping industry in Australia, building on the strengths that both countries share and looks forward to continuing our work with partners to drive this industry forward.



Steve Kim, GreenPlus CEO and MD, emphasised the importance of food security when he took part in the recent Australia-Korea Business Council Joint Meeting in Perth.

NFF CEO departs for new role

Tony Mahar, National Farmers' Federation CEO, has announced his resignation from the role after eight years.

The NFF thanked him for his dedicated service and strong leadership. Tony takes up the position of Australian Energy Infrastructure Commissioner in December.

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Jiffy Blueberry Mix aids growers in China

Garden City Plastic's Gary Edwards hosts a discussion with Arjan van Leest, Soft Fruit Expert at Jiffy Group, and Miguel Meneses, Jiffy's Product Manager for Substrates. They explore how Jiffy's tried-and-tested mix boosts blueberry yields and improves overall fruit quality for growers in the competitive Chinese market.

As China's demand for premium, locally grown blueberries intensifies, indoor mid-tech growers face challenges around water management, substrate quality, and yield consistency. Jiffy Blueberry Mix offers a tailored solution to address these needs.

Melbourne-based Garden City Plastics (GCP) distributes a wide range of specialised Jiffy mixes and has seen demand explode across key APAC markets like China.

GARY EDWARDS OF GARDEN CITY PLASTICS *Arjan, what are the main challenges indoor mid-tech blueberry growers face in China?*

Arjan van Leest, Jiffy Group's Soft Fruit Expert Blueberries are finicky plants, especially in indoor environments. In China, growers often struggle with inconsistent climate control and variable water quality, both of which are critical to achieving high yields. Additionally, blueberries require precise moisture management and root aeration, and when these factors are mismanaged, it can lead to uneven growth, poor fruit quality, and even plant loss.

Jiffy Blueberry Mix addresses these challenges directly. Its carefully engineered blend balances air-filled porosity (AFP) at 28-38 per cent and water-holding capacity (WHC) at 50-70 per cent. These parameters ensure sufficient oxygen for root respiration and prevent waterlogging, common issues

when growers transition to mid-tech systems where irrigation practices might not yet be fully optimised. Our mix creates a more forgiving growing environment, reducing the risks associated with over- or under-watering.

GARY *How does the composition of Jiffy Blueberry Mix support optimal blueberry growth in Chinese conditions, Miguel?*

Miguel Meneses, Jiffy Product Manager Substrates The key to this mix lies in its premium coir, peat and perlite blend. Coir has excellent capillary characteristics. When combined with the high water-holding capacity of peat, these make it the ideal substrate for challenging irrigation conditions. The low pH and high cation exchange capacity of peat also ensure consistent fertilisation, compensating for any nutritional imbalances, something that coir or perlite alone cannot achieve.

Blueberries thrive in acidic conditions, and Jiffy Blueberry Mix delivers with a pH

“JIFFY BLUEBERRY MIX IS A TESTAMENT TO HOW WE TRANSLATE OUR EXPERTISE INTO REAL-WORLD YIELD IMPROVEMENTS.” MIGUEL MENESES, JIFFY PRODUCT MANAGER SUBSTRATES.

“BY CRAFTING A SUBSTRATE WITH THE RIGHT BALANCE OF ACIDITY, AIR AND WATER RETENTION, WE’RE HELPING GROWERS TO IMPROVE PRODUCTIVITY.” ARJAN VAN LEEST, JIFFY SOFT FRUIT EXPERT.



Jiffy Blueberry Mix helps stabilise growing conditions even in challenging climates.



Jiffy and Garden City Plastics have been supporting growers for decades.

of 4.3, perfectly suited to their needs. It’s also designed to maintain an electrical conductivity (EC) of 0.4, which prevents harmful salt buildup that could stifle plant growth. This is especially critical in regions with varying water salinity, a challenge frequently reported by Chinese growers.

GARY What specific benefits does Jiffy Blueberry Mix offer for mid-tech growers?

Arjan Mid-tech growers often work with semi-controlled environments, meaning they’re more vulnerable to fluctuations in temperature and humidity. In such cases, managing the substrate properly becomes essential to avoid moisture-related issues. The WHC of 50-70 per cent in Jiffy Blueberry Mix ensures a more stable moisture supply, even between irrigation cycles, reducing the risk of plant stress during dry periods.

In trials conducted with growers in eastern China, who often face fluctuating irrigation quality, we actually saw yield improvements of up to 15 per cent. This was largely due to the substrate’s superior ability to retain moisture while providing ample air for the roots, which in turn helped optimise fruit development.

GARY How can Jiffy Blueberry Mix support expansion into the Chinese market?

Arjan In China, demand for high-quality, locally grown blueberries is rapidly increasing, and growers are seizing the

opportunity to develop vertically integrated berry operations. They’re introducing world-leading technologies, setting new benchmarks for quality, and establishing efficient supply chains. This focus on protected cultivation systems and substrate-based growing is driving innovation in the sector.

Jiffy Blueberry Mix is designed to support these ambitions by providing a high-performing substrate that consistently delivers better yields and quality. It’s ideal for growers adopting modern indoor systems to enhance productivity. It’s also RHP-certified, ensuring that it meets stringent quality standards for professional horticulture, and produced in Jiffy’s ISO 22000 food safety-certified factories.

In the face of rising competition and changing consumer preferences, achieving stable and high-quality output is essential. Jiffy’s tailored solutions, developed through decades of experience, offer growers the foundation they need to succeed in China’s evolving blueberry sector.

GARY What role does substrate quality play in yield improvement?

Miguel I’m probably biased, but I strongly believe the substrate is the foundation of any successful crop! Poor-quality growing media can lead to compaction, root rot, or imbalanced nutrition—all of which severely impact yields. Jiffy’s decades of experience and global expertise allow us to create substrates that provide consistent results, even in challenging growing environments.

Our expertise doesn’t stop at blueberries; we support growers across various sectors globally, providing solutions that improve both plant health and productivity. Our substrates and technical advice help growers focus less on managing problems and more on growing better-quality fruit, whatever their setup.

Thanks to Arjan and Miguel for sharing their insights! Backed by Jiffy’s global expertise, Jiffy Blueberry Mix is the reliable solution for boosting productivity in this tough market. Sounds too good to be true?

Contact Gary Edwards of Garden City Plastics, to plan a trial today.



Last word *with Andrew Tout*

Vertical farming: it's not rocket science – please lettuce explain!

Ah, vertical farming. The latest shiny object in the world of investment, especially for those who like their portfolios like their salads: green, sustainable, and 'disruptive'. It's the future, right?

A dazzlingly high-tech solution to feed the world in shrinking urban spaces. But here's the thing: in all their enthusiasm to revolutionise agriculture, some investors seem to be underestimating a few things, namely: farmers and nature.

Nature, people, is smarter than your latest AI algorithm.

Let's talk about the sun. It's free, abundant, and best of all, plants love it. So what do we do in vertical farming? We shut it out. Instead of letting plants bask in its golden glow, we slap some LED lights on them and call it a day.

We're tricking nature, but nature is not so easily fooled. Even with the best high-tech lights, there's no substitute for the full spectrum of sunlight.

Then there's the small matter of farmers. These folks have been coaxing crops out of the earth for centuries, and they do so with an uncanny mix of knowledge, patience, and a respect for nature that tech geeks might do well to study.

Some investors might think they can outsmart these agricultural artisans with fancy algorithms and endless data streams, but farmers are the ones who know when it's too hot, too cold, or when that weird-looking beetle is about to ruin your entire crop. Meanwhile, investors are sitting in their office suites, typing sustainable farming into Google and wondering why their spinach tastes like a plastic bag.

Let's not forget some things actually do thrive in the dark. Mushrooms love the dark. They'll grow just fine without sunlight, and many vertical farms have wisely jumped on the mushroom bandwagon. The problem? Mushrooms don't pay the rent on a high-tech vertical farm. They might be low maintenance, but they don't have the same market demand or profit potential as leafy greens or tomatoes.

And yet, in their zeal to bypass nature, many investors find themselves knee-deep in the dark, metaphorically and financially. When the numbers on their vertical farming projects don't quite add up, they discover that farming strategies based on expensive LED lights, HVAC systems, and climate-controlled units are only slightly more affordable than a luxury yacht. So, while they thought they were going to disrupt the agricultural world, they end up with a stack of bills higher than a stack of hydroponic lettuce.

It's time to look beyond the hype of

vertical farming and turn to a proven, more sustainable alternative: the glasshouse industry. Glasshouses provide all the benefits of vertical farming, space-efficient growing systems, year-round production, reduced environmental impact, without the massive energy costs and reliance on artificial lights.

Glasshouses harness the natural power of the sun, providing crops with free, abundant sunlight while protecting them from the elements. They allow for controlled environments that help maximise yields, just like vertical farms, but at a fraction of the energy cost. Instead of relying on high-tech LED lights to simulate sunlight, glasshouses make full use of the sun's natural warmth and light, reducing the need for costly artificial systems. The result? A more cost-effective, sustainable solution to urban food production.

The best part about modern glasshouses is that they enhance what nature's already providing. This is where the funky tech comes in. LED lights, automated irrigation, climate control systems, all those cool gadgets that make farmers feel like they're on the cutting edge are being used in a glasshouse to optimise growing conditions. But for heaven's sake, don't block out the sun! It's free, it's there almost every day, and it's the important ingredient in the recipe for healthy, thriving crops.

Andrew Tout is PCA Chair and Head of Agriculture for Centuria.

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