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Protected Cropping Australia Industry Trade Magazine



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Clarke from
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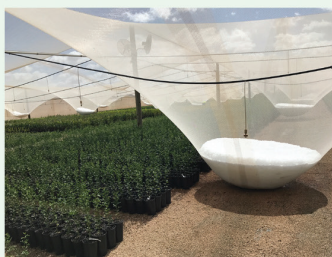
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FRONT COVER

Cheyne Clarke in his glasshouse on the New South Wales north coast where he's producing berries, cucumbers, eggplants and tomatoes. See the full story on page 16. Photo Phil Dudman



ISSN 2209-3567

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Any correspondence concerning the magazine should be sent direct to the editor: editor@protectedcropping.net.au

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We at A1 Growsystems are proud of the Double Screen installations at FlavoriteTatura in May 2022.

We installed an energy saving screen and a shade screen in the greenhouse (with an area of about 6 ha.). We were invited to attend the opening to celebrate this beautiful day together.

We are happy that our cooperation will continue, recently we have been commissioned to install an energy saving screen and a shade screen on the newly built greenhouses (greenhouse 6 and 7) in total 12 ha.

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PCA Director, Elio Jovicich, speaking recently at TROPAG in Brisbane.

Sam Turner reports on an eventful few months for Protected Cropping Australia and plans for the 2023 conference.

As Australia's east coast keeps flooding, the importance of protected cropping has never been clearer. There is more and more interest in protected cropping from government and research, as well as investors. Protected cropping is quickly becoming a food security insurance policy. For growers working on the coal face of this wave of interest, PCA is working to deliver more training and support, more investment in resources, and advocating for improvements to the business conditions.

In the new year, PCA will be streamlining and improving member services to support grower profitability and increase the connection to grower members. PCA is only as strong as the growers we serve and we want to deliver the services you need. In the meantime, we have been busy.

Study tour and AGM

Western Sydney University hosted PCA members for a joint AGM and study tour. Growers and members were treated to a tour of the amazing National Vegetable Protected Cropping Centre and came away with some great insights on the use of advanced light manipulation science as well as alternative pollination techniques and IPM practices.

Chair Matt Plunkett also hosted PCA's 2022 AGM. Congratulations to Elio Jovicich, Kaela Bonomi and Zak Iqbal for their nominations to the Board.

The group were then treated to a tour of Bilpin Fruit Bowl where they inspected the dedicated 'U-Pick' facility and were given a rundown of the land use planning challenges that the group is facing.

TROPAG

The University of Queensland, QAAFI and the Queensland government hosted industry from October 31 to November 2. This was a great opportunity for researchers, government, growers and industry stakeholders to learn about the future of food production in the tropics. There was a heavy focus on protected cropping and vertical farming systems. The event was well attended and some great lessons for northern Australia and around the world. One interesting outcome was the interest in applying protected cropping systems to the production and extraction of nutraceutical compounds.

Conference PCA '23

Planning is well underway for next year's PCA conference. It will be held at the Brisbane Convention and Exhibition Centre from July 17-20, 2023. The theme 'Growing our future' will be the focus, highlighting people, planet, profits. Suggestions of topics or speakers are warmly welcomed (get in contact via phone or email).

As we move into the busy holiday season, I hope you have a safe and productive summer and looking forward to continue to assist in any way we can into the new year.

Sam Turner is based in Victoria and can be reached on email sam.turner@protectedcropping.net.au or phone 0437 469 607.

pcaconference.net.au' and the PCA logo."/>

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Greenhouse growing technology gets US funding boost



The Controlled Environment Agriculture Research Complex, Ohio, is in a state-of-the-art greenhouse that opened in October as a research and teaching hub. Photo Ohio State University

Researchers in the US are hoping to speed up the adoption of greenhouse technologies with a huge injection of funding through a grant of US\$3.77million from the US Department of Agriculture.

The Ohio State University's College of Food, Agricultural, and Environmental Sciences (CFAES) is leading the research and development project, which is aimed to help greenhouse growers create the most ideal growing environment using real-time data and climate optimisation processes. Rutgers University is also involved.

Chieri Kubota, a CFAES Professor of Horticulture and Crop Science, will lead the project with AJ Both, a Professor of Environmental Sciences at Rutgers University.

Speaking about the background behind the project, Prof. Kubota said protected growers in the US depend on the adoption of new technologies from The Netherlands that adhere to different design standards, measurement units and government regulations, which delay the adaptation of new technologies in the US.

Research will be carried out at the Controlled Environment Agriculture Research Complex, Ohio, in a state-of-the-art greenhouse which opened in October as a research and teaching hub. The research has four main aims: develop a data- and model-driven decision-making platform; validate the efficacy of new data; understand socioeconomics of greenhouse technology adaptation and with engage stakeholders.

The new complex is also home to the George Washington Carver Science Park, the first-ever science park devoted to space research. Portions of this research include growing food in zero to low gravity aboard a commercial space station in low-earth orbit, an environment that relies on everything plants need to thrive.

For more information see cfaes.osu.edu.



Chieri Kubota, CFAES Professor of Horticulture and Crop Science (centre), at the opening of a new research facility for controlled environments and growing crops in space. Photo Ohio State University



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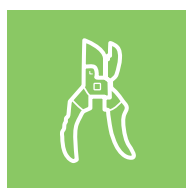
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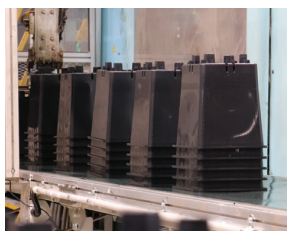
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United Nations
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JANUARY

24-27

IPM Essen World Trade Fair,
Essen, Germany; ipm-essen.de/
world-trade-fair

31-February 2

Berry Health Benefits
Symposium, 9th biennial
conference, Tampa Bay, Florida,
US; berryhealth.org

FEBRUARY

8-10

Fruit Logistica, All in One, Berlin,
Germany; fruitlogistica.com

14-15

Food Processing Expo 2023,
Sacramento, California, US;
tomatonews.com

14-16

HortiContact, The pride of
Dutch greenhouse horticulture,
Evenementenhal Gorinchem, The
Netherlands; horticontact.nl

23-24

BioSolutions Conference
& Expo,
Peppermill Reno, Reno,
Nevada, US;
biosolutionsconference.com

MAY

22-24

VertiFarm2023, II International
Workshop on Vertical Farming,
Chengdu, China; ishs.org,
convenor Prof. Dr Qichang Yang,
email: yangqichang@caas.cn

JUNE

I International Symposium
on Growing Media, Compost
Utilization and Substrate Analysis
for Soilless Cultivation, Quebec
City, Canada; re3-quebec.org/en

JULY

19-21

ISHS Rubus + Ribes 2023,
XIII International Rubus and Ribes
Symposium, Portland, Oregon,
US; web.cvent.com. Note:
pre-symposium tour is July 16-18.

July 19-21 'Growing our Future',

Protected Cropping Australia
conference 2023, Brisbane Convention Centre, Brisbane, QLD;
protectedcropping.net.au; for those interested in being a
conference partner or exhibitor, contact Nitesh Patel on email
nitesh.p@asnevents.net.au.



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The monitoring station automatically measures water, fertiliser, electrical conductivity (EC) and pH.

helps to avoid disease problems.

To be certain, the water is treated with hydrogen peroxide, automatically, when the tank is refilled.

All run-off water from the crops inside the greenhouse is treated in an ultra-filtration unit, to remove pathogens. Then it's blended with fresh nutrient before being reused on the crops. Recycling this way helps to avoid leaching of fertiliser into the environment and provides a massive saving in fertiliser costs.

"More growers should consider it," says Cheyne. "There are set-up costs involved, but it pays itself off pretty quickly."

High ammonia fertilisers used in growing blueberries are more difficult to recycle on crops. Cheyne has set up some tanks to capture this run-off and uses it on the lawn and gardens surrounding the farmhouse. He has the greenest lawn in the district!

Cheyne is a big fan of biological pest controls. With the help of Jake Byrne

from Biological Services Australia, he has introduced an endoparasitic wasp, *Encarsia formosa*, to control greenhouse whitefly on tomatoes and a predator wasp (*Aphidius* sp.) to deal with aphids on eggplants. Both have proven successful, and he hasn't had to spray chemicals.

"It costs money, but so does spraying, and it does less damage to your crop and yourself," Cheyne says. "The key to success is to introduce the good bugs early before you have a big problem."

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Double ridge vents and an insulated air-filled twin skin cover are some of the features of the Harford greenhouse.



Cheyne checking the statistics and measurements.

In addition, he adds a biological conditioner to the irrigation water to help build pest and disease resistance in plants. Cheyne also believes his new climate control greenhouse provides a more stable environment for plants, making them healthier and more pest and disease resistant.

"I'm not certified organic – it's hard to do in hydroponics – but I'm as close as I can be," he says. This has helped to build a good relationship with buyers.

"They will choose your produce over others if they know you're trying to do the right thing."

Challenges and opportunities

Fruit fly in blueberries is a universal problem in this area during the warmer months. Cheyne uses traps and bait sprays to monitor and reduce numbers. When numbers are up, he does a cover spray.

Bees are brought in to help pollinate the berries. There were issues locally this year with varroa mite, but he was lucky to be outside the zone, so he still installed hives. He also has his native beehives and lots of flowering natives to help keep them interested when blueberries aren't flowering.

"Native bees don't like getting out of bed when it's cold or rainy, so you need a mix of both," he explains.

With increased shipping costs forcing up the price of cocopeat, Cheyne is trialling HydraFiber, a new, more cost-effective product made in the US from plantation timber. He's found that it stays moist for longer, which means he uses less water and fertiliser.

While it's difficult to find trained workers, Cheyne believes there are great opportunities for young people looking for a

career in horticulture, especially in managing large scale hydroponic systems.

"This is a great industry, with a big future. I have met so many good people through the PCA (Protective Cropping Australia) and they have helped me create a successful business."

More information

Bark Hut Berries is at 36 Bark Hut Road, Woolgoolga, NSW. Phone: 0404 386 956 (Cheyne).

About the author

Phil Dudman is a gardening writer, presenter and tour leader based in Northern New South Wales where he hosts 'Good Gardening' on ABC North Coast radio on Saturday mornings and regular grow your food workshops in his backyard patch (growyourfood.com.au).

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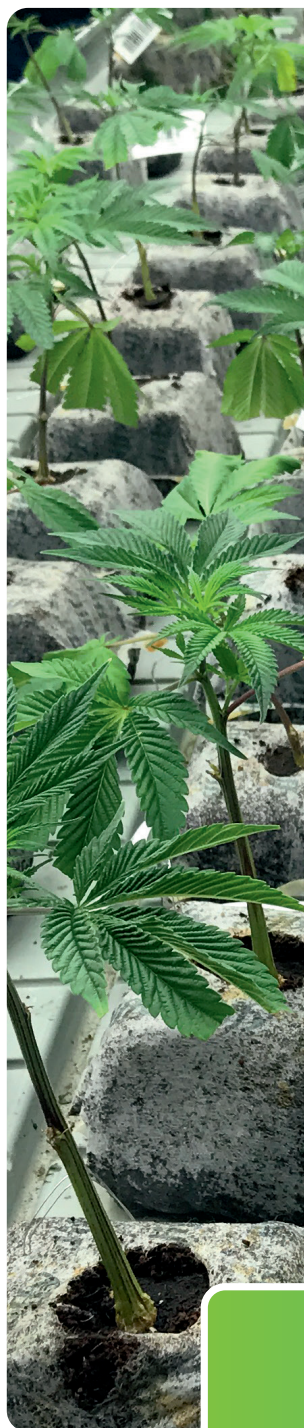
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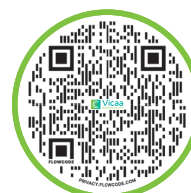
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consequently they may visit fewer flowers per insect. However, this can be compensated for by stocking them at higher rates.

Blow flies are already commercially available as pollinators and can be purchased from Sheldon's Baits in South Australia. The cost is approximately \$30 for 500 flies including shipping, which is enough to adequately pollinate 900 strawberry plants for four weeks when newly emerged adults were supplied with excessive sugar solution for three days before release. Longer flowering seasons may require multiple releases, as blow flies typically only live for around a month.

Research at Western Sydney University (WSU) has demonstrated that blow fly-pollinated strawberries yield similar levels of quality and weight as hand-pollinated strawberries, and far better than strawberries in the absence of a pollinator.

Although some growers have expressed concerns to us about potential bacterial contamination when using flies as pollinators, our preliminary research has shown that these commercially reared flies are unlikely to transfer bacteria to seeds, fruit or vegetables.

Blue-banded bees

Blue-banded bees (*Amegilla* species) are another group of native bees with interesting potential as managed pollinators for protected cropping. Blue-banded bees, like bumble bees, are buzz pollinators. This is important for tomatoes and other solanaceous crops which require sonication (such as buzz pollination) to release their pollen from the flower anthers.

Research at Western Sydney University and the University of Adelaide has shown that these bees are excellent pollinators of tomatoes, transferring more pollen per visit than bumble bees. However, blue-banded bees are solitary and don't live in big colonies. This is a significant challenge to establish and maintain captive populations capable of pollinating crops at a commercial scale.



A native Australian blue banded bee (*Amegilla* sp.)
Photo Michael Duncan

A new Hort Frontiers project based at WSU is exploring methods for rearing and maintaining captive populations of these solitary bees, as well as the wider range of crops that they can pollinate effectively in glasshouses.



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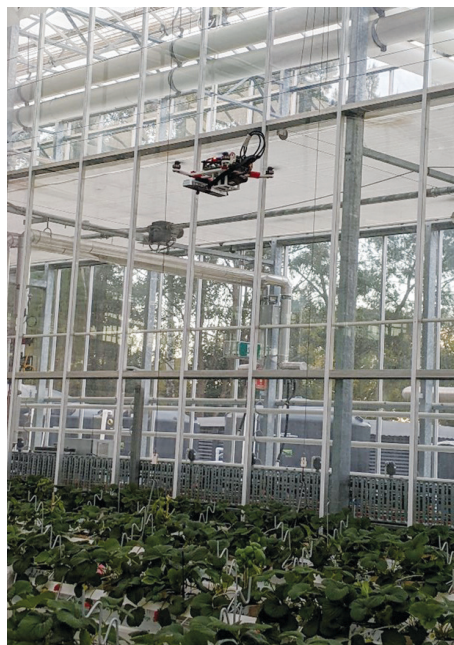
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Drones

Despite their pollination efficiency, the use of insect pollinators has some limitations depending on external factors such as crop design, plant species, temperature, and cost-efficiency.

An unmanned aerial vehicle (UAV), also known as a drone, has been in development in recent years to fill this gap. The underlying principle is to use 'downwash', a downward force generated when the drone is flying, to disperse pollen. This drone pollination targets self-pollinated crops aiming to reduce the labour required compared with other mechanical techniques such as hand pollination.



An automated pollination drone during a strawberry pollination trial at Western Sydney University. The prototype drone is developed by Polybee Pte Ltd, Singapore. Photo Patsavee Utaipanon

Using micro-drones allows engineers to incorporate autonomous technology that can further reduce the number of people required during pollination season.

This technology is still in the early stage of development but provides promising results. The main challenge is to engineer the characteristics of the pollination force, flight path, flight pattern, and software to suit different plant species and crop designs.

Choosing the right option for you

When considering using alternative insect pollinators it is important to discuss your needs with suppliers and confirm which species are suitable to import and release in your growing area. Each state has its own legislation around which species can be used.

It is also important to consider crop biology. For example, does your crop flower produce nectar that is likely to be broadly attractive to generalist flower visitors like flies, or does the flower require a specialised buzz-pollinator? Furthermore, is your growing system semi-open (such as a tunnel) or fully enclosed? If growing in a tunnel, it may be necessary to make regular additions of pollinators to maintain good numbers. This is particularly true of flies, that may migrate out of tunnels to look for food and breeding sites.

Reference

DF Cook, SC Voss, JTD Finch, RC Rader, JM Cook, CJ Spurr, 'The role of flies as pollinators of horticultural crops: An Australian case study with worldwide relevance', *Insects* 11 (6), 341.

About the authors

Jon Finch is a lecturer in Entomology at the University of Tasmania. James Cook is Professor of Entomology at Western Sydney University. Onyeka Nzie and Patsavee Utaipanon are research fellows at Western Sydney University.

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Part of this autumn's ginger harvest from Mise En Place Farm ready to be sold at local farmers' markets. Photo Facebook

says some of the challenges facing growers interested in trying to grow vanilla include a prevalence of sterile plants, growing the wrong species and disease problems.

Dr Chambers told *Greenhouse Grower* that there are only two varieties of vanilla that are approved for food use as vanilla extract. He also identified what he called "silent viruses" in vanilla plants in the US that take nutrition from the plants without showing any disease symptoms.

To overcome virus diseases, the researchers searched for and found bean-producing vanilla plants that were free of diseases to use as the basis for establishing clean crops. They then partnered with local growers Brian and Shelley Fehrenbacher, at Fallen Oak Farms and Tampa Greenhouses, who became a test site for growing organic, premium vanilla (*Vanilla planifolia*). Shelley says they are hoping to fulfill some of the demand for organic vanilla from their greenhouses.

Turmeric and ginger

Turmeric and ginger are also popular for commercial producers under protected cropping in the US due to their high profit margins. Dr Paul Fisher, Professor and Extension Specialist in the Environmental Horticulture Department at the University of Florida, told *Greenhouse Grower* that most growers who are growing ginger and turmeric for food, produce it in fields, high tunnels, or shade structures to reduce costs.

"With tissue culture liners from AgriStarts," Dr Fisher says, "these are easy crops to grow and produce multiple stems that fill out a container."

He reports that they have a quick crop time, taking just two to three months to produce a plant in a 1- to 2-gallon container.

JJ Minetola of Mise En Place Farm in Davidsonville, Maryland, grows ginger and turmeric in an unheated high tunnel. He trained as a chef before becoming a farmer. JJ Minetola sells the ginger and turmeric he produces at a local farmers' market, where he receives US\$1.50 per ounce for ginger and US\$1.25 per ounce for turmeric. Ginger and turmeric from the farm are also used in food such as tacos cooked and sold at local markets.

The herbs are also wholesaled to a local shop, Rutabaga Juicery, earning \$9 to \$10 per pound (around AUS\$30/kilo).

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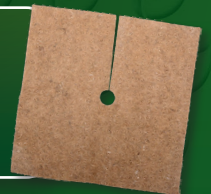
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Pest watch: chilli thrips

Chilli thrips is an emerging and worrying endemic pest that's becoming very active in parts of Australia.

Over the past two to three years, production nurseries and plant retailers have reported a dramatic increase in the damage being caused by the chilli thrips (*Scirtothrips dorsalis*) across a range of plant hosts. Greenlife Industry Australia's (GIA) National Biosecurity and Sustainable Plant Production project team has produced a technical fact sheet to help growers to mitigate the damage this pest can cause to crops.

Chilli thrips is widely distributed along its native range in Asia including Bangladesh, Brunei, Darussalam, China, Hong Kong, India, Indonesia, Japan, Republic of Korea, Malaysia, Myanmar, Pakistan, Philippines,

Sri Lanka, Taiwan and Thailand. It was first reported in north-western Australia approximately 20 years ago so it isn't a new pest, but its numbers appear to be growing, especially in Western Australia.

The thrips are tiny, sap-sucking insects that can cause deformities in flowers, leaves, stems and shoots and are a known vector of viruses including groundnut chlorotic fan-spot virus, groundnut yellow spot virus, tomato spotted wilt virus and tobacco streak virus.

Also known as strawberry or yellow tea thrips, *S. dorsalis* feeds on roses, all citrus (and their hybrids), as well as a wide range of fruit, vegetable and home garden and indoor ornamental plants. The host list is extensive and includes native plants, ornamentals and productive plants including capsicum and strawberries. In Western Australia the damage has been mostly reported on roses.

More information

GIA, the national body for the nursery industry, has prepared a free, six-page factsheet, which covers life cycle, plant hosts, damage and control. The factsheet can be downloaded from the GIA website at www.greenlifeindustry.com.au

Introduced pest chilli thrips is becoming more active in WA. Photo Aderksen at English Wikipedia, CC BY-SA 3.0



Chilli thrips control in US

Research on the control of this pest is also underway in the United States. Scientists at the University of Florida have been looking at different ways of controlling the pest particularly in strawberries. Chilli thrips reduces saleable strawberries, and the damage has led to major losses in production. In research published in *BioOne Complete*, scientists outline the use of a biopesticide, which is a capsicum extract, and the predatory mite *Amblyseius swirskii* in the battle against chilli thrips. The biocontrols were compared with spinetoram.

In discussion of the results from the trial the researchers note results of this study indicate that the predatory mite, *A. swirskii* and the *Capsicum oleoresin* extract are as effective as spinetoram in the suppression of *S. dorsalis* adults up to seven days after treatment only. Also, *A. swirskii* is as effective as spinetoram in suppression of larval *S. dorsalis* for at least 21 days after treatment. Plant damage can be suppressed as effectively by *A. swirskii* as spinetoram for up to 28 days after treatment due to effective larval suppression. Therefore, *A. swirskii* can be included as an effective biological control agent of *S. dorsalis* as a replacement for repeated use of synthetic insecticides.



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Unusual bee species discovered

A new native bee species with a dog-like 'snout' has been discovered in Perth bushland though research led by Curtin University that sheds new light on our most important pollinators.

Published in the *Journal of Hymenoptera Research*, author Dr Kit Prendergast from the Curtin School of Molecular and Life Sciences, has named the new species after her pet dog Zephyr after noticing a protruding part of the insect's face looked similar to a dog's snout, and to acknowledge the role her dog played in providing emotional support during her PhD.

Dr Prendergast said the rare and remarkable finding would add to existing knowledge about our evolving biodiversity and ensure the bees, named *Leioproctus zephyr*, were protected by conservation efforts.



This native bee from Western Australia has recently been described as a new species and named after a pet dog.

"When I first examined the specimens that I collected during my PhD surveys discovering the biodiversity of native bees in urbanised regions of the southwest Western Australia biodiversity hotspot, I was instantly intrigued by the bee's very unusual face," Dr Prendergast said. "When I went to identify it, I found it matched no described species, and I was sure that if it was a known species, it would be quite easy to identify given how unusual it was in appearance."

"You can only confirm a particular species once you look at them under a microscope and go through the long process of trying to match their characteristics against other identified species, then going through museum collections."

"When perusing the WA Museum's Entomology collection, I discovered that a few specimens of *Leioproctus zephyrus* had first been collected in 1979, but it had never been scientifically described."

Dr Prendergast said she was excited to play a role in making this species known and officially naming them.

"Insects in general are so diverse and so important, yet we don't have scientific descriptions or names for so many of them," Dr Prendergast said.

"*Leioproctus zephyr* has a highly restricted distribution, only occurring in seven locations across the southwest WA to date and have not been collected from their original location. They were entirely absent from residential gardens and only present at five urban bushland remnants that I surveyed, where they foraged on two plant species of *Jacksonia*."

"Not only is this species fussy, it also has a clypeus that looks like a snout. Hence, I named them after my dog Zephyr. She has been so important to my mental health and wellbeing during the challenging period of doing a PhD and beyond."

Through DNA barcoding, Dr Prendergast was able to confirm that the new species was most closely related to other species of unidentified *Leioproctus*.

The full paper is titled '*Leioproctus zephyr* Prendergast (Hymenoptera, Colletidae, Leioproctus)', an oligolectic new bee species with a remarkable clypeus'.

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Blueberry market continues to grow



The blueberry market and demand for the fruit is continuing to grow. Photo Adobe Stock Photos

The blueberry industry is becoming truly global, with fast-growing supply and/or demand in most continents reports Rabobank. Per capita availability is set to continue an upward trend in the US, the EU-27+UK, China, and other markets, driven by continued production expansion reports David Magaña, Senior Analyst – Horticulture with Rabobank.

Competition on the global playing field is increasing, with Peru marching on and Mexico and a few other up-and-coming exporters expanding shipments. Going forward, industry trends include:

the probability of declining unit prices for Peruvian exports, stagnation in Chilean production, and an increase in substrate-grown berries in Mexico.

As the blueberry industry faces increasing input costs, labour issues and logistical challenges, companies are pushed to become more productive and efficient, and to consistently provide high-quality fruit. The adoption of improved cultivars and technologies such as the use of substrates, protected culture and mechanical harvesting will help growers solve a number of supply-side challenges concludes the report.

New appointment at Piñata farms

Leading fresh fruit producer, Piñata Farms has appointed Demetrio Bruno as site operations manager at its strawberry and raspberry farm at Stanthorpe in southern Queensland.

A grower with experience in protected cropping environments, Demetrio is responsible for overseeing the production of raspberries and strawberries under polytunnels.

Before joining Piñata Farms, he worked in hydroponic cucumber production further north in Queensland in Bundaberg, and in high-tech glasshouse cucumber production on the New South Wales Central Coast.

Originally from Italy, Demetrio has a Bachelor of Agricultural Science and Technologies.



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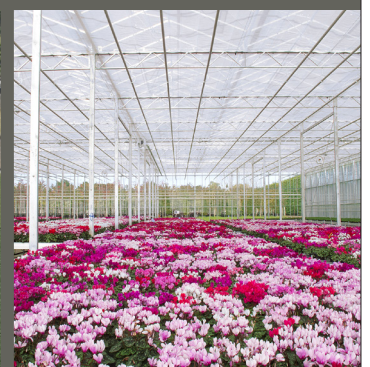
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