

Australian Government

Department of Agriculture, Water and the Environment

Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry

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2022 Award Recipients

We thank our partners for their support and commitment to the 2022 Science and Innovation Awards





















Wine Australia for Australian Wine



Welcome to the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry

Recognising innovative scientific projects that will contribute to the ongoing success and sustainability of Australia's agricultural industries

The 2022 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry are coordinated by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), the research division of the Department of Agriculture, Water and the Environment.

We thank the panel of judges for their significant contribution to the 2022 Science and Innovation Awards.

If you would like to learn more about the Science and Innovation Awards, visit **awe.gov.au/scienceawards**.

For information about ABARES, range of work and its publications, visit **awe.gov.au/abares**.

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Welcome to the Science and Innovation Awards

Our agriculture sector is having a bumper period, with high commodity prices, drought breaking rains and record levels of production. The rebound in production that has occurred over the past two years in response to the good seasonal conditions has brought to light the continued productivity growth that has been occurring over time. This success, and our sustainable production credentials, are underpinned by science and innovation, an area where our producers, supported by governments, have continued to invest.

The Science and Innovation Awards are one example of that investment and partnership and so I am delighted to present the 12 winners of the 2022 round of the Science and Innovation Awards, showcasing clever approaches married to new technologies all driven by the desire to contribute to the continued success of Australian agriculture and our producers.

These 12 projects will be undertaken by researchers, scientists, students and lecturers from every state and territory in Australia. Their projects include:

- Cost-benefit analysis of soil amendment to increase carbon sequestration of Australia plantation trees.
- Engineering elite tree crops cultivars.
- Scrotal thermoregulation of the ram: effects of heat stress on reproductive performance.
- Traceable cotton fibres.
- A practical strategy to implement precision nutrition for layer hens via liquid mineral inclusion to drinking water.

- Impact of residual glycogen on sensory attributes of Australian lamb.
- Sniffing smoke taint Sensing phenols in the vineyard and the winery.
- Building a leafminer genomic databank to track incursions and adaptation.
- Qualitative behaviour assessment to define worker attitude and labour disparity between confinement free and traditional farrowing crates.
- Seaweed as a natural feed supplement to boost growth and immunity in farmed crustaceans.
- Wastewater grown microalgae as a source of biofertilizer and biostimulant for emerging crops.
- Silencing the frost damage caused by ice nucleating bacteria in Australian fields.

The Science and Innovation Awards provides the department an opportunity to assist in the development of emerging early-career researchers in the agricultural sector, and engage with research and industry organisations as our award partners. I extend my thanks to our Award partners for their leadership in research and development and collaboration between industry, tertiary and government.

Please join me in congratulating the deserving recipients of the 2022 Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.



Dr Jared Greenville

Executive Director ABARES



About the Science and Innovation Awards

The Department of Agriculture, Water and the Environment, with our Award partners, presents the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. The Science and Innovation Awards are a competitive grants program that provides funding for innovative research projects to benefit Australia's rural industries.

Attracting applications from young Australians aged 18–35 years, the Science and Innovation Awards aim to:

- assist primary producers to develop more competitive, productive and self-reliant industries through attracting innovative research proposals that will lead to longer term innovation in the sector
- advance the careers of young scientists, researchers, producers and innovators through national recognition and funding of their research ideas
- encourage the uptake of science, innovation and technology in rural industries
- increase interaction between the Award recipients, the Award partners, the tertiary and government sectors.

The Science and Innovation Awards commenced in 2001 and have since provided grant funding for 284 individuals, supporting projects that demonstrate a fresh way of thinking about, and resolving issues for, agriculture. Recipients can build strong networks across their industry while gaining national and international exposure for their work by presenting at conferences and seminars, and publishing papers. Ultimately each has the chance to progress in their chosen career.

In 2022 there were 12 Award categories open to applicants, each generously supported by the leading research and development corporations and industry organisations.

Successful category Award recipients were then invited to apply for additional project funding to pursue their research ideas via an extended research project – the Minister for Agriculture's Award.

Each of this year's recipients have been awarded funding to undertake their project over a 12 month period. The results from their research will contribute to the ongoing success and sustainability of Australia's primary industries. We look forward to sharing those outcomes with you.

Dr Mingkai Jiang



RECIPIENT OF THE Forest & Wood Products Australia Award

Environmental scientist Dr Mingkai Jiang is testing the feasibility of using powdered basalt to boost wood production in plantations—something he believes could change Australia's carbon credit policy.

Previous research has suggested adding basalt to agricultural land can increase soil fertility and enhance production.

"But we just don't have enough evidence to say that for sure for the plantation industry," Mingkai says.

"So, I want to make a full assessment of the potential of using powdered basalt."

If successful, the project could see basalt applied to existing plantations in Australia—potentially increasing both wood production and carbon sequestration.

Mingkai says it's possible existing plantations could even be included in carbon credits.

"I would hope that, once we have some evidence, we could start implementing a large-scale field-based assessment," he says.

"So that eventually it could lead to some policy change in the future."

Mingkai grew up in China and studied in the UK and US before moving to Sydney. He now based at the Western Sydney University.

In 2020, he led a *Nature* paper demonstrating the impact of high carbon dioxide levels on *Eucalyptus* forests.

The study, featuring the EucFACE experiment and with contributions from almost 50 scientists, questioned the assumption that forests will store more carbon as carbon dioxide levels rise.

"Current models are predicting that, in the future with much higher CO_2 concentrations in the air, plants will grow more, so that they can help mitigate climate change," Mingkai says.

"But now, our evidence... doesn't support this hypothesis, because their ability to grow is limited by soil fertility."

For Mingkai, this Science and Innovation Award marks a transition from fundamental research to work that results in direct action for climate change.

"I think we, as scientists, need to actively explore nature-based solutions to directly contribute to climate change mitigation," he says.



Forest & Wood Products Australia



Forest and Wood Products Australia Limited (FWPA) is a not-for-profit company that provides national, integrated research and development services to the Australian forest and wood products industry.

We are committed to helping the forest and wood products industry to be collaborative, innovative, sustainable and competitive against other industries and products available in the marketplace. We support research and development that promotes internationally competitive and environmentally sustainable practices. We promote activities that enhance employment opportunities and contribute to growing Australia's reputation as an innovative producer of high-quality forest and wood products.

Our mandate is determined by our members, who comprise wood processors, forest growers, and Australian importers of forest products.

Visit www.fwpa.com.au.

Dr Stephanie Kerr



RECIPIENT OF THE Hort Innovation Award

Dr Stephanie Kerr is working to develop new methods of genetically manipulating macadamia and mango trees to develop elite cultivars, and faster.

Stephanie, an expert in horticultural tree genomics and Research Fellow at the Queensland University of Technology, explains trees are notoriously difficult to genetically modify.

She says the most common way to modify plants uses a bacteria called *Agrobacterium tumefaciens*. But the bacteria typically only infects certain types of plants.

"It can be very difficult to get it to work in [some] species," Stephanie says.

"And specifically for mango and macadamia—often you infect the leaf tissue, but mango and macadamia have a thicker cuticle on the surface of the leaf.

"[It] makes it more difficult for things to get inside,"

To overcome this, Stephanie's Science and Innovation Awards project will test a new technique that uses nanoparticles to silence genes within the tree. It involves tiny 'nanotubes' created by collaborators at UC Berkeley, which are designed to be small enough to enter the cells of the plant.

Stephanie will also try microwounding making tiny holes in the surface of the leaf to make it more susceptible to *Agrobacterium* infection.

Ultimately, her research aims to help growers better understand the function of different genes in mango and macadamia trees.

"We don't know really much at all about what genes control different phenotypes and traits, and how those particular genetic pathways respond to different stimuli like temperature," Stephanie sayexplains.

It could lead to the faster creation of new cultivars better able to cope with climate change or fight off disease.

"There's basically a whole world to be explored," Stephanie says.

"And I think having these tools available would really speed up that process."



Hort Innovation

Hort Innovation

Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australia's \$15.1 billion+ horticulture sector, which is the fastest-growing sector across all of agriculture. Each year the company invests more than \$120 million into exciting R&D, trade, extension and marketing initiatives on behalf of Aussie growers and

others involved in horticulture. We're dedicated to providing the best knowledge and solutions to our growers, to in turn drive a prosperous and healthy Australia. More information about the company, how we're funded, and details of our hundreds of projects can be found at www.horticulture.com.au.

Bobbie Lewis Baida



RECIPIENT OF THE Australian Wool Innovation Award

Animal scientist Bobbie Lewis Baida is exploring how hot weather impacts ram fertility.

High testicular temperature is known to reduce the amount of morphologically normal, motile and fertile sperm.

And with temperatures rising under climate change, Bobbie's Science and Innovation Awards project will see her investigate how scrotal and body temperature regulation affects semen quality and fertility in Merino rams.

The study is the first of its kind to investigate the impact of hot weather in rams on the farm, rather than in climate-controlled rooms.

Bobbie, from the University of Adelaide, says the project complements her existing PhD research on the impact of heat stress on ewes.

She is using vaginal temperature sensors to monitor the core temperature of ewes in the paddock, linking this to behaviour, ovulation rate, conception rate, foetal growth and lamb birthweight.

Adding rams will allow Bobbie to collate a complete picture of how climate change will affect sheep reproduction. "I'll hopefully be able to tie it all together and address a lot of unanswered questions," she explains.

The temperature of ram testicles is regulated independently, typically sitting at $4-5^{\circ}$ C below the animal's core body temperature.

Bobbie will study how hot weather affects this over the 2022/23 summer, using technology designed to continuously monitor scrotal and body temperature with minimal impact on the rams.

With a recent review reporting that heat stress around mating costs the Australian sheep industry approximately \$97 million each year, Bobbie says there is an urgent need to address the issue.

"I know for a fact that farmers out there are just trying to make a sustainable living and feed the world in a changing climate," she says.

"I think it's important that we realise the ramifications of climate change, and I'm really excited that my research is a part of solving the problem in a small way."



Australian Wool Innovation



Australian Wool Innovation Limited (AWI) is the research, development and marketing (RD&M) organisation for the Australian wool industry.

AWI is responsible for managing and investing levy funds received from over 55,000 levy

payers and matching eligible R&D contributions from the Australian Government.

AWI invests in RD&M across the supply chain to enhance the profitability, international competitiveness and sustainability of the Australian wool industry, and to increase the demand and market access for Australian wool.

Visit www.wool.com.

Dr Xiaoqing Li



RECIPIENT OF THE Cotton Research and Development Corporation Award

Dr Xiaoqing Li is exploring a way of tracing Australian cotton fibres—something she hopes will make it easier to choose sustainable textiles.

Together with her colleagues, she recently developed a genetically engineered cotton germplasm, which produces a protein that does not exist naturally in cotton fibres.

Xiaoqing is a leader in the generation of novel fibres for the cotton industry, and her Science and Innovation Awards project will investigate the presence and stability of this introduced foreign protein in cotton for the first time.

Xiaoqing believes it could be used to develop a way of tracing cotton back its original source.

"If this protein is stable and can be detected, after the fibre matures, possibly we can trace it from the beginning to the end of the life of the fibre," she says.

Now Canberra based, Xiaoqing grew up in China and studied in the UK before moving to Australia as a research scientist. She says customers are seeking more sustainable products, particularly in the textile industry.

That includes materials grown in a sustainable way and manufactured under fair labour conditions.

"Unfortunately, without good traceability ... it's hard to tell where the material comes from," Xiaoqing says.

"Are the traits good or not? We don't know.

"So, traceability is a very good tool to make this happen, to improve the whole supply chain sustainability."

Xiaoqing says existing traceability techniques typically rely on either added pigments, which need extra processing steps, or written records, which can lack transparency.

She says her project fills a gap in the science.

"We haven't seen any plant-based technology being developed in this area," she says, "so if this can happen, it really can make a leap forward."



Cotton Research and Development Corporation



CRDC COTTON RESEARCH AND DEVELOPMENT CORPORATION

The Cotton Research and Development Corporation (CRDC) invests in world-leading RD&E to benefit Australia's dynamic cotton industry. We invest in innovation and transformative technologies and programs to deliver impact.

We invest along the entire cotton supply chain – from growers to customers. One of our

core strategic goals is building the adaptive capacity of the cotton industry: ensuring we are enhancing our scientific research capability, acquiring new talent and facilitating the local and global exchange of ideas.

CRDC has long been a supporter of the Science and Innovation Awards, and we continue our involvement to help support and reward young scientists for their exploration of concepts, and creation of new knowledge in the pursuit of scientific breakthroughs.

Visit www.crdc.com.au.

Dr Amy Moss



RECIPIENT OF THE Australian Eggs Award

Poultry nutritionist Dr Amy Moss wants to make it easy to give layer hens the nutrients they need at different times of the day.

In the morning, layer hens need a lot of protein while they ovulate a yolk and deposit the egg white around it.

In the afternoon, they need calcium as they lay down the eggshell.

"If you feed just one diet, you're feeding way too much calcium in the morning but not nearly enough calcium in the evening," Amy explains.

"Research has shown good results feeding hens one diet in the morning and another in the evening," Amy says.

But providing two diets is impractical for industry because it means building more feed silos.

Instead, Amy's Science and Innovation Awards project will trial delivering extra calcium to hens in the evening through their water, using existing on-farm infrastructure.

"Most producers already have dosing systems that can provide medication through the water," she says. "So essentially, they would just add the liquid mineral to the dosing system to automatically bring it to all the hens in the evening."

Feed is the single highest expense for egg farmers, making up 65% of production costs.

If successful, Amy's project could ease pressure on producers from rising feed costs.

"If the hens are using all the nutrients that they have, and wasting less, that means it's going to bring economic benefits," she says.

Feeding two diets also improves egg quality and is good for the environment because less nutrients are excreted.

It's also beneficial to the hens themselves.

"If they don't get the calcium that they need through the diet ... they'll take it out of their bones," Amy says.

Amy plans to communicate her project results to producers and industry through webinars as well as industry and magazine articles.



Australian Eggs



Australian Eggs is a member owned not-for-profit company providing marketing, research, development and extension services for the benefit of Australian egg farmers.

Working together with the egg industry and the Australian Government, Australian Eggs strives to deliver value to industry and the public by investing in programs that increase egg consumption and ensure industry sustainability. All known Australian egg farmers are serviced by Australian Eggs, irrespective of their size, location or farming system.

Australian Eggs conducts R&D across a wide range of areas including:

- Feed and hen nutrition
- flock health and disease management
- environmental sustainability
- food safety and human nutrition
- animal welfare
- extension, adoption and technology transfer.

Visit www.australianeggs.org.au.

Sonya Moyes



RECIPIENT OF THE Australian Meat Processor Corporation Award

Taste testers will sink their teeth into lamb as part of Sonya Moyes' project on the impact of glycogen on eating quality.

It's known in the sheep meat industry that a high pH means poorer eating quality in lamb.

And one thing that lowers the pH is residual glycogen, which is converted to lactic acid post-slaughter.

Sonya, from Perth's Murdoch University, says animal scientists suspect that having enough glycogen at slaughter is linked to good eating—but we don't yet know the full story.

"We've looked back at all papers to the 1980s, and in no species have they really examined the impact of loin residual glycogen on eating quality," she says.

"So, it's going to be a bit of a world first, going and looking at that."

Sonya's Science and Innovation Awards project will see everyday consumers of lamb meat try seven different cuts of lamb, scoring them on tenderness, juiciness, flavour and overall liking.

If glycogen does turn out to be a strong driver of eating quality, Sonya explains it could be incorporated into a Meat Standards Australia prediction model for sheep meat.

"We already know a couple of factors that need to be in that model in order to predict eating quality," she says.

"But we're just now going to test if glycogen needs to be included as well."

The research could also be applied to other industries.

"If we find a big effect in sheep, I think it is definitely something that could be looked at in both beef and pork," Sonya says.



Australian Meat Processor Corporation



The Australian Meat Processor Corporation (AMPC) is the specialist research and development (R&D) provider for Australian meat processors – wherever they are, whatever their markets, no matter their size. AMPC's mandate is to provide research, development, and extension (RD&E) services that improve the sustainability and efficiency of the sector. AMPC's strategy is to work in close partnership with our members and innovation partners to advance the Australian meat processing industry.

AMPC's purpose is to enable Australia to build the most competitive, profitable and sustainable red meat processing industry.

Visit www.ampc.com.au for more.

Dr Samantha Sawyer



RECIPIENT OF THE Wine Australia Award

University of Tasmania food scientist Dr Samantha Sawyer is helping winemakers sniff out smoke taint in the vineyard.

Samantha's Science and Innovation Awards project aims to develop an early warning system for winemakers to detect smoke taint in the field.

The system, using MQ gas sensor prototypes, will be designed to measure the compounds that cause undesirable characteristics in wine, rather than just smoke levels.

"So it will pick up the phenols, which are the smoke taint compounds, in the air," Samantha explains.

If successful, the project could save winemakers time and money in having to send grapes to the lab at a cost of hundreds of dollars a sample.

Smoke taint occurs when grapes absorb phenols produced by burning wood, causing undesirable smoky flavours in the finished wine.

The taint typically manifests as a burnt, ashy, medicinal or cigarette-like taste.

Unfortunately, smoke taint cannot be tasted in the grape, only in the finished wine.

"A premium sparkling wine could be aged for three years to a decade," Samantha says.

"You do not want to find out after a decade that you haven't got something saleable."

Samantha's project will trial an 'e-nose' developed at the University of Tasmania to detect phenols in the vineyard.

She will also test the technology on a "quick and dirty ferment" typically performed by winemakers.

Samantha says smoke taint a huge priority for the wine industry.

In 2019-20, 3% of the national crush was lost, rejected or downgraded because of fire, according to Wine Australia.

"For the individual growers, that could be their entire vineyard," Samantha says.

"And it can cripple the entire industry, because it's a reputational risk."



Wine Australia

Wine Australia for Australian Wine

Wine Australia supports a prosperous Australian grape and wine community by investing in research, development and adoption (RD&A) projects, encourages growth in domestic and international

markets and protects the reputation of Australian wine.

Our support of the Science and Innovation Awards is one example of our commitment to the development of the next generation of researchers who will help to drive the Australian grape and wine community's future.

We are funded by grapegrowers and winemakers through levies and export charges, and by the Australian Government, which provides matching funding for R&D investments.

Visit www.wineaustralia.com.

Dr Thomas Schmidt



CSIRO Biosecurity digital innovation Award

Dr Thomas Schmidt is developing quick solutions to combat the threat of invasive leafminers, and haplotagging is key.

When the *leafminer Liriomyza trifolii* was detected in three Australian regions in 2021, growers were worried.

The invasive insects were recorded more than 1500km apart, at Ord River in Western Australia, Katherine in the Northern Territory and Cape York in Queensland.

No one knows where they came from, or what risk they pose to the rest of Australia.

"This is a dangerous threat to Australian agriculture that has been on our radar for a bit," explains Thomas, from the University of Melbourne.

"Liriomyza trifolii has caused recorded damage to around 170 plant species worldwide.

"If this species was allowed to invade south-east Queensland, then, in three years, it could cause an estimated \$140 million of damage... and that's just one location."

For his Science and Innovation Award project, Thomas will build a genomic databank—a collection of DNA sequence data—from leafminers in Australia and overseas. He'll then use the databank to trace the sources of last year's invasions, as well as draw on it for any future detections.

It builds on Thomas' previous research in mosquitoes.

"We've been actually intercepting mosquitoes as they come off a plane coming from overseas into Australia," he says.

"From that, we use genetics to work out where they're coming from by just matching their DNA against the DNA of other mosquitoes from across the Indo-Pacific.

"I want to do something very similar for this species. It's taking biosecurity into a digital and molecular future."

The project will use a new technology called 'haplotagging', which was originally developed in butterflies.

Thomas loves that biosecurity is a very fast-moving type of research.

"I like that in terms of rapid responses, and the idea that we've got, to come up with quick solutions. By understanding the risks around different incursion pathways, we can deploy biosecurity resources much more efficiently," he says.



CSIRO Health and Biosecurity

 With increasing global trade and greater connections, Australia is facing a larger challenge in protecting itself against biosecurity threats. Diseases, pests, invasive

animals and plants can inflict damage to our health, crops, livestock and farm profits and to our unique environment.

CSIRO assembles strong multi-disciplinary research teams working to achieve optimal health for people, animals, plants, the economy and environment to tackle major national and international biosecurity challenges. COVID-19 has made everyone aware of the importance of biosecurity preparedness and the need for better systems and technological solutions. We are working with government and industry to assist in responding quickly to stop threats in their tracks and provide sustainable management strategies. We are exploring new digital systems and technologies for detection, surveillance, diagnosis and response.

Overall we are focussed on developing a national biosecurity system that is pre-emptive, responsive, resilient, and based on cutting edge surveillance, informatics and new technologies for integrated response.

Visit www.csiro.au/en/Research/BF.

Lauren Staveley



RECIPIENT OF THE Australian Pork Limited Award

Animal scientist Lauren Staveley believes a crucial factor in best-practice animal welfare is the staff working with the animals.

Lauren's Science and Innovation Awards project will focus on the stockperson on pig farms, looking at their experience and approach towards free-farrowing pens.

Free-farrowing pens allow sows to move around before, during and after giving birth. Currently in Australia most sows are housed in a farrowing crate just prior to giving birth until weaning their piglets.

After three years of working with farrowing and lactating sows, Lauren believes that whilst farrowing pen design is important, a bigger potential factor is staff training and knowledge of how to best use the pens.

Whilst there is anecdotal evidence of this, Lauren's investigation will be the first to quantify this observation.

"When staff are confident with the new system and understand the sow and her piglets, free-farrowing can work really well," Lauren explains.

Lauren says the Australian pork industry works on research projects that provide science-based data in regard to pig welfare, but also stockperson development, as the industry looks at different housing options.

Lauren's project also considers the consequence of the sows' freedom of movement on piglet losses. Piglet loss can occur because of accidental overlay by the sow. Lauren believes staff input is an equally important driver of a safe farrowing system that meets the needs of the pigs, as well as the safety of staff.

Lauren says that when staff are educated in sow behaviour and how to best manage piglet welfare, there is less piglet loss.

She says she's often asked about the ideal design of a free-farrowing pen, from size to structure.

"But size and structure are less of a concern once staff have the right training," Lauren says.

Lauren plans to use the findings from the project to enhance existing training tools to upskill Australian staff. This will enable a world-class approach to farrowing and better outcomes for the pigs and the people that care for them.



Australian Pork Limited



Australian Pork Limited (APL) is the national representative body for Australian pork producers.

APL is a producer-owned, not-for-profit company enhancing the viability

of Australia's pork industry. APL undertakes marketing, innovation and policy work on behalf of Australian pork producers, in association with relevant industry and government stakeholders, focussed on key strategic targets including:

- Consumer support for Australian pork
- On-farm productivity and profitability
- Animal health and welfare leadership
- Climate friendly production systems

APL is funded through statutory pig slaughter levies, with additional research-specific funds provided by the Australian Government.

Visit www.australianpork.com.au.

Valentin Thépot



RECIPIENT OF THE Fisheries Research and Development Corporation Award

Valentin Thépot is testing whether seaweed, as a natural feed supplement, can boost immunity and growth in farmed prawns.

As a PhD student four years ago, Valentin discovered that feeding seaweed to fish improves both their immune response and growth rate.

He started with 11 different species of seaweed, before finding the red seaweed Asparagopsis taxiformis offered the greatest benefits to the fish.

Now, for his Science and Innovation Awards project, Valentin wants to see if Asparagopsis has a similar effect on prawns—the first time the supplement has been tested on crustaceans.

As well as growth and immune response, he'll also measure productivity—the amount of weight the prawns put on for every gram of feed they're given.

Valentin grew up in France, splitting his childhood between his family's dairy farm and the ocean.

He discovered aquaculture after moving to Queensland, and previously worked in a commercial barramundi hatchery. Valentin says disease outbreaks are one of the biggest threats to sustainable aquaculture, costing the industry more than \$8 billion a year.

"It usually claims about 10% of the seafood that is produced in aquaculture," he says.

But Valentin believes seaweed has huge potential, with his previous research showing that adding seaweed to the diet of Atlantic salmon and rabbitfish improved the fishes' immune response by 400% and growth by 19%.

For this project, Valentin will collect small amounts of seaweed from the wild, and feed it to the prawns as both the whole dried seaweed and a methanol extract.

Valentin says disease outbreaks in aquaculture represent a massive loss of protein that could be fed to a hungry world.

He says because pathogens are increasingly resistant to antibiotics, we need to look for alternative prevention and treatment methods for these outbreaks.

"Being able to solve that through an organic way, using natural seaweed supplements, is quite an attractive solution," Valentin says.



Fisheries Research and Development Corporation



The Fisheries Research and Development Corporation (FRDC) plans and invests in fisheries research, development and extension (RD&E) to increase economic, social and environmental benefits for Australian fishing, aquaculture and the wider community. One important area of investment is people development, where we foster people to develop their knowledge and capabilities and, in turn, assist the fishing and aquaculture sectors to reach their potential.

We are looking for someone with a great idea that addresses a stakeholder priority detailed in our **R&D Plan 2020–25**. This is an opportunity to develop your science skills and build your networks with other researchers, fishing and aquaculture businesses and the FRDC.

Visit www.frdc.com.au for more.

Dr Ashiwin Vadiveloo



RECIPIENT OF THE AgriFutures Australia Award

Turning waste nutrients in agricultural effluents into biofertiliser under Dr Ashiwin Vadiveloo's ambitious project to integrate algae farming and traditional agriculture.

Ashiwin, from Perth's Murdoch University, will trial growing microalgae in wastewater from livestock farms and meat production.

He will then use the algae as fertiliser for jackfruit and pomegranate trees.

If successful, the proof-of-concept study could prove a win-win for farmers and the environment.

"Basically, it establishes a circular economy," Ashiwin says. "You get cleaner water, and also you get the algae which can be used as a fertiliser.

It's not only potentially generating profit to local farmers, but at the same time helping them to deal with the problems associated with wastewater.

Ashiwin grew up in Malaysia and in 2020 was named in Forbes Magazine's "30 Under 30" for healthcare and science in Asia. He says he's excited to evaluate the potential of algae grown in wastewater rather than expensive synthetic medium that require added fertilisers.

"I believe this has not been tested anywhere around the world before," Ashiwin says.

Biofertilisers such as algae are expected to play a vital role in the sustainable farming systems of the future, but they're currently more expensive to produce than chemical fertilisers.

Ashiwin says growing algae in wastewater could be a game changer.

"The potential is huge, but it needs more research and more testing to be done to identify how efficient they are," he says.

"The first thing is to evaluate it and do fundamental research like the project I'm looking at.

Then we can go up to the techno-economics and making it cost competitive."



AgriFutures Australia



AgriFutures Australia proudly focuses on the future of Australian agriculture. We live and work in the regions and represent the interests and aspirations of primary producers and rural communities.

Our vision is to grow the long-term prosperity of Australian rural industries and communities through:

• Initiatives that attract capable people into careers in agriculture, build the capability of future rural leaders, and support change makers and thought leaders.

- Research and analysis to understand and address important issues on the horizon for Australian agriculture.
- Research and development for established industries that do not have their own research & development corporation.
- Research and development to accelerate the establishment and expansion of new rural industries.

For more information **www.agrifutures.com.au**

Jaco Zandberg



RECIPIENT OF THE Grains Research and Development Corporation Award

Molecular microbiologist Jaco Zandberg aims to develop a spray that can protect crops from frost damage.

Jaco was recently part of a team which identified that 'ice-nucleating' bacteria is linked to severe frost damage in Australia.

The bacteria—known as Pseudomonas produces proteins that raise the temperature at which water freezes in the environment.

It means frost damage can occur at temperatures as high as -2°C, rather than the -8°C to -10°C usually needed in the field.

But Jaco says the idea for his Science and Innovation Awards project came in part from his partner Samantha Harvie, who just finished her honours studying 'vesicles' produced by bacteria.

His proof-of-concept study will explore whether vesicles can be used to carry interference molecules that will temporarily shut down production of icenucleating proteins.

"The vesicles produced are 100% natural, they're not toxic, they're not GMO," Jaco explains. "They're essentially just an easy-to-use, naturally-forming nanostructure that can capture desired products and bud into other bacteria."

"So we thought maybe we could combine both the vesicles and anti-ice nucleating molecules to create a novel technology."

Ultimately, Jaco hopes to develop an easy-to use spray that can be applied by farmers when a frost event is forecast.

Jaco says it was important not to create a permanent off-switch, as the bacteria are still an important part of the plants' microbiome.

"The technology is not meant to just go in there and wipe the bacteria out," he says.

"[It] is just meant to suppress that activity when the farmer knows the frost event is coming, then it goes back to normal again. So, the functionality is restored."

For Jaco, who grew up rolling around in fields of lucerne in rural South Africa, it's great to be working on a technology that could directly benefit farmers.

"I've committed to a career in agriculture and will take every opportunity presented to me to better understand it, and create new and long-lasting connections with people in the industry."



Grains Research and Development Corporation



The research, development and extension (RD&E) GRDC has invested in over the last three decades has had an enormous impact on the Australian grains industry's profitability and efficiency.

RD&E has led to the creation of new, high value crop industries in Australia including canola, chickpeas and lentils. It's also increased the sustainability of farming operations through the doubling of water use efficiency, and providing growers information to make more informed input decisions.

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