



School of Applied Science

# BIENNIAL REPORT

2024

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INNOVATING ALONGSIDE  
THE INDUSTRY

# Vision and Mission

## Vision

*To be a world-class institution in the global education network, reputed for our programmes, applied research, managerial excellence and innovative corporate culture.*

## Mission

*To prepare school-leavers and working adults for a future of dynamic change, with relevant knowledge, life-long skills, character, and a thirst for continuous improvement.*



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## Message from Mr Peter Lam

Principal and Chief Executive Officer, Temasek Polytechnic



Last year, the collective efforts of the entire TP community to contribute to our sustainability journey was showcased at TP-ECollab Symposium 2023, where we have shared TP's sustainability journey with friends, industry partners and the community. We also learned from leading industry experts as they graciously shared practical applications, insights and real-world cases for the participants to bring back and add value to their sustainability journeys. In collaboration with Fuji Oil Pte Ltd and Roquette Asia Pacific Pte Ltd, our Bistro Lab merged sustainability, innovation, and profound ingredient expertise to bring refreshment items made from plant-based alternatives and upcycled food products to the symposium participants.

Partnerships with the industry are crucial in our applied training, and our collaboration modes with industry partners have evolved over the years. We seek greater collaboration and coordination within the Polytechnics/ITE as well as with other public research institutions and universities for greater collective impact. At the same time, we are constantly expanding the integration of technology, innovation and applied research with our student training. With support from Enterprise Singapore, TP now plays a greater role to support industry innovation in various sectors which have been identified to require innovation support in their transformation journey.

Our School of Applied Science (ASC) embraces innovation efforts with industry and curates experiential learning opportunities for our students. You can find out more in this report!

When Singapore returned to normalcy in 2022, TP started many initiatives to bring more value to our students while aligning our priorities with the nation's.

Singapore Green Plan 2030 is a whole-of-nation movement to advance Singapore's national agenda on sustainable development. In 2022, we have put together a Sustainability Committee, led by the Chief Sustainability Officer, to look at current practices and establish responsible sustainability reporting in carbon footprint, energy and water consumption. A new subject, Sustainability and Climate Action, aimed to increase sustainability awareness has been introduced in TP Fundamentals, a collection of modules taken by all TP students. In addition, two of the Technology Clusters have been renamed to Food Sustainability and Environment Sustainability respectively, to better reflect TP's work in these areas.

## Interview with Ms Farhana Nakhooda

Chairperson, School of Applied Science Advisory Committee  
Senior Vice-President, Health Catalyst Asia Pacific



### How would you conceptualize the idea of 'innovating alongside the industry' within the context of an educational institution?

Innovating alongside the industry within an educational institution involves active engagement with industry trends, challenges and advancements to develop relevant and forward-thinking educational practices. For example, the different ASC Centres of Excellence collaborate with local and overseas industry partners to innovate and devise marketable solutions and technologies through research and projects. These spaces provide students with resources, as well as mentorship, and networking opportunities to develop their applied research skills. By fostering an entrepreneurial mindset and supporting innovation, students can contribute to the growth and competitiveness of local industries. The expertise of industry leaders on the SAC provides invaluable guidance, ensuring that educational programmes remain relevant and responsive to industry needs. Staff and students benefit from the first-hand real-world perspectives shared by the industry leaders in SAC, thus ensuring the long-term success of our educational programmes.

### In your view, how has the ASC adapted to keep pace with industry changes?

ASC is instrumental in preparing students for the workforce, ensuring they are well-prepared to navigate the ever-evolving global economy and contribute meaningfully to their chosen fields. By regularly updating the curriculum to incorporate emerging technologies with an emphasis on hands-on training, the School maintains alignment with industry standards and progression. Collaborative initiatives with industry partners provide valuable opportunities such as internships, research endeavours, and guest lectures. Staff engage in continuous professional development to stay abreast of the latest developments in their respective fields. Guided by the School Advisory Board (SAC) comprising industry experts, ASC maintains a finely tuned curriculum that empowers students with the knowledge and skills required in their careers. Additionally, the cultivation of transferable skills alongside technical competencies has been deliberately infused to enhance students' overall employability and adaptability in the dynamic job market.

# Foreword from Dr Goh Lay Beng

Director, School of Applied Science, Temasek Polytechnic



Sustainability is yet another area that TP embraces. At ASC, we innovate alongside the industry and co-urate sustainable solutions while providing training opportunities. Not just for our own staff and students but also those from other schools at TP, other institutions such as the Institute of Technical Education, and those from foreign universities. In fact, ASC is now impacting education and supporting industry transformation further afield through collaborations with ASEAN countries, China and India.

Technology is another area of focus, with Food Sustainability and Environment Sustainability being the two main clusters for the industry projects we undertake as part of the Differential EXperiential Programme (DXP) - ASC's signature programme. Through this three year programme, students discover (at their own pace) their passion in research through laboratory experimentation, guided learning, and capstone projects. All of ASC's research cum training centres are now part of the national ecosystem of centres of innovation, funded by Enterprise Singapore (ESG). TP is also part of the pioneering group supporting the new National Centre of Engineering Biology (NCEB) at the National University of Singapore. Funded by the National Research Foundation's Mid-Sized Grant, the Centre focuses on industry sectors of aquaculture, urban agriculture, complementary health products, future foods, the built environment (advanced materials) and in applied synthetic biology.

Sustainability at ASC is more than a training and research focus. Being sustainable in how we live, learn, work and play every day is something we want to internalise. Hence, we celebrate simple ground up sustainable initiatives like replacing bottled water with the use of reusable cups, adopting environmentally friendlier disposables for takeaways at our training cafeteria, sharing reusable bags as a community, and more. Even this current issue of our Biennial Report is only available in digital form.

We thank everyone in the teaching and training ecosystem for their support for ASC all these years. Because of you, we can continue to make a difference. Thank you!

It is with great pleasure and pride that we present you with the May 2022 - Apr 2024 issue of our Biennial Report, a culmination of everyone's dedication at our SERIOUSLY FUN SCHOOL!

We have come a long way, from Learning Together, Growing Together to Adapting to the New Norm (hyperlink to e-reports), and now Innovating Alongside The Industry.

Applied and industry-relevant training is the anchor for polytechnic education in Singapore. This is also the impetus behind ASC's launch of the Common Science Programme. Through a multitude of learning activities, students encounter theory, participate in experiential and applied learning as they navigate towards their areas of interest, before finally arriving at their early career choices.

# School Advisory Committee



11th SAC  
(From left to right)

Prof Paul Teng, Dr Keith Lim, Mr John Cheng, Mr Lu Jin Ping, A/Prof Lita Chew, Dr Goh Lay Beng, Ms Lisa Liaw, Ms Farhana Nakhoda, Ms Lee Hee Hoon, Mr Lucas Ng, Mr Mock Siew Fai, Mr Melvin Chow, Mr Sng Meng Liang.

Name	Role	Name	Role
<b>Ms Farhana Mansoor Nakhoda</b> Senior Vice President Health Catalyst Asia Pacific	Chairperson	<b>Mr Lu Jin Ping</b> Managing Director, Hitchins International Pte Ltd President, American Concrete Institute Singapore Chapter	Member
<b>Dr Goh Lay Beng</b> Director, School of Applied Science Temasek Polytechnic	Deputy Chairperson	<b>Mr Mock Siew Fai</b> Site Leader INEOS Phenol Singapore Pte Ltd	Member
<b>Ms Lisa Liaw</b> Director Financial Controller American Express (Singapore, Malaysia, Philippines)	Member	<b>Mr Lucas Ng Hong Kiang</b> Senior Advisor & Head of Sustainability Petrochemical Corporation of Singapore (Private) Limited	Member
<b>Dr Chang Siow Foong</b> Director-General, Animal & Veterinary Service, National Parks Board, Singapore	Member	<b>Mr Sng Meng Liang</b> General Manager Aastar Pte Ltd	Member
<b>Dr Cheng Wen Haur</b> Deputy Chief Executive Officer, Life Sciences & Operations / Chief Life Sciences Officer Mandai Wildlife Group	Member	<b>Mr Jeffrey Tan Choong Cher</b> Co-Founder (The New Age Fishmonger) DISHTHEFISH Pte Ltd	Member
<b>Assoc. Prof Lita Chew</b> Group Director, Allied Health, SingHealth Head of Pharmacy, National Cancer Centre Singapore	Member	<b>Mr John Cheng</b> Founder, Innovate 360 Pte. Ltd. Co-Founder and Chairman, Feed9B	Member
<b>Ms Lee Hee Hoon</b> Director, Allied Health & Community Operations Ng Teng Fong General Hospital	Member	<b>Dr Ong Siew Kim</b> Senior Principal Medical Laboratory Scientist, Pathology Sengkang General Hospital	Member
<b>Mr Melvin Chow</b> Senior Director, Urban Food Solutions Division Singapore Food Agency	Member	<b>Prof Paul Teng</b> Managing Director & Dean National Institute of Education International Pte. Ltd	Member
		<b>Dr Keith Lim</b> Group Head of Medical and Quality IHH Healthcare (Singapore Branch)	Member

# School Management

Name	Role	Name	Role
<b>Dr Goh Lay Beng</b>	Director	<b>Dr Kadamb Patel</b>	Head
<b>Dr Maisha Foo</b> Academic Development	Deputy Director	Centre for Research & Opportunities in Plant Science	
<b>Dr Kalpana Bhaskaran</b> Industry Partnerships	Deputy Director	<b>Dr Miao Huang</b>	Head
<b>Dr Loh Gin Hin</b> Quality Development and Planning	Deputy Director	Centre for Urban Sustainability	
<b>Mr Tan Keng Beng</b> Student Development	Deputy Director	<b>Dr Loh Gin Hin</b>	Domain Chair
<b>Dr Wuang Shy Chyi</b> Technology Development	Deputy Director	Education Research and Development	
<b>Mr Siew Yong Pau Zacchaeus</b> Chemical Engineering	Course Chair	<b>Dr Rufaihah Abdul Jalil</b>	Domain Chair
<b>Ms Johanna Tan</b> Food, Nutrition & Culinary Science	Course Chair	Future Foods	
<b>Dr Chan Giek Far</b> Medical Biotechnology	Course Chair	<b>Dr Kalpana Bhaskaran</b>	Domain Chair
<b>Ms Shahedah Bte Mohd Ali</b> Pharmaceutical Science	Course Chair	Glycemic Index Research Unit	
<b>Ms Valerie Koh</b> Veterinary Technology	Course Chair	<b>Mr Bong Chee Keong</b>	Domain Chair
<b>Dr Clara Teo</b> Common Science Programme	Course Chair	Water Technology	
<b>Ms Loh Win Nie</b> Centre for Applied Nutrition Services	Acting Head	<b>Dr Jiang Li</b>	Senior Manager
<b>Dr Diana Chan</b> Centre for Aquaculture & Veterinary Science – Aquaculture Innovation Centre	Head	Technical and Infrastructure Support	
<b>Dr Jiang Fengli</b> Centre for Aquaculture & Veterinary Science – Veterinary Science	Head	<b>Ms Magdeline Hor</b>	Senior Manager
<b>Dr Edmund Tian</b> Centre of Innovation – Complementary Health Products	Head	Academic Development	
		<b>Mr Aaron Yuen</b>	Manager
		Chemical Engineering	
		<b>Mr Wong Weng Wai</b>	Manager
		Food, Nutrition & Culinary Science	
		<b>Dr Lee Yun Hwa</b>	Manager
		Medical Biotechnology	
		<b>Mr Justin De Silva</b>	Manager
		Pharmaceutical Science	
		<b>Dr Low Ji Zhen</b>	Manager
		Veterinary Technology	
		<b>Mr Randy Chow</b>	Manager
		Bistro Lab	
		<b>Mr Louis Tay</b>	Manager
		Digital Admin	
		<b>Ms Lin Meilin Phoebe</b>	Manager
		Technical and Infrastructure Support	
		<b>Dr Li Huan</b>	Manager
		Centre of Innovation - Complementary Health Products	

# Institutional Review Board and Institutional Animal Care and Use Committee

## Institutional Review Board (IRB)

Name	Role	Internal / External Member
<b>Dr Nicholas Ngui</b>	Chairperson	External
<b>Dr Lee Ming Chong, Ivor Russel</b>	Co-Chairperson / Scientific person	External
<b>Dr Lim Wei Wen</b>	Scientific person	External
<b>Dr Jonathan Cheah Weng Kwong</b>	Layperson	External
<b>Mr Lim Kwang Kok</b>	Layperson	External
<b>Dr Clara Teo Ru Lin</b>	Secretary / Scientific person	Internal (ASC)
<b>Mr De Silva Justin Ignatius</b>	Scientific person	Internal (ASC)
<b>Dr Leong Meng Fatt</b>	Scientific person	Internal (ASC)
<b>Dr Fu Yi</b>	Scientific person	Internal (ENG)
<b>Dr Gabrielle Lai</b>	Secretary / Scientific person	Internal (HSS)
<b>Dr Tan Wah Pheow</b>	Scientific person	Internal (HSS)
<b>Mr Looi Kwok Peng</b>	Layperson	Internal (BUS)
<b>Mr Chan Weng Kit</b>	Layperson	Internal (RPD)

## Institutional Animal Care and Use Committee (IACUC)

Name	Role
<b>Dr Jiang Fengli</b>	Chairperson
<b>Dr Low Ji Zhen</b>	Attending Veterinarian
<b>Dr Joshua Chan</b>	Secretary / Non Scientific Member
<b>Ms Valerie Koh</b>	Scientific Member
<b>Dr Padmanabhan Saravanan</b>	Scientific Member
<b>Dr Mohamed Shirhan Mohamed Atan</b>	Scientific Member
<b>Dr Christian Bluechel</b>	Non-Scientific Member

# Innovating Alongside the Industry - Our Centres of Excellence and Centres of Innovation

Innovation is crucial to improving the core business activities in enterprises. By fostering growth, Innovation is key to help enterprises and organisations stay ahead of the game in today's highly competitive work. At ASC, there are five centres to drive applied research and innovation. These centres were set up to support the industry and facilitate the skills mastery of staff and students. Now, they are part of the national ecosystem to drive industry innovation and continue to play an important role in integrating student training with technology, innovation and enterprise applied facilitate.

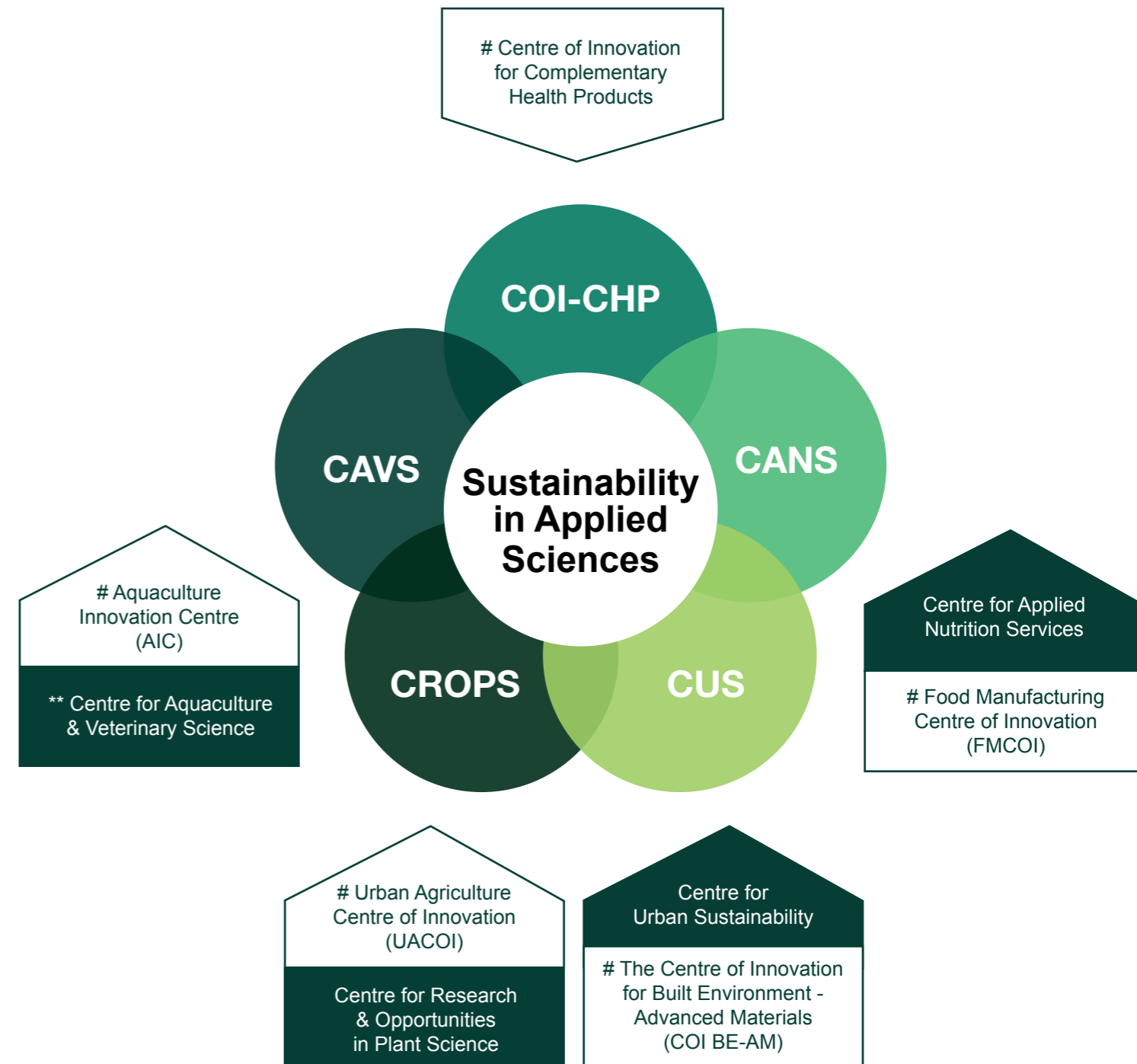
Since 2016, the Centre of Innovation for Complementary Health Products (COI-CHP) offers new and customised solutions to enterprises in traditional medicines, health supplements and functional foods such as product formulation, safety and efficacy testing. Backed by its strong capabilities in chemical and biological testing, COI-CHP has partaken in product, process and method development and solutioning with many industry partners in the CHP sector.

Formalised in 2019 after years of capability building, the Aquaculture Innovation Centre (AIC) supports the aquaculture industry through applied research, skills development, and consulting services. As part of the Centre for Aquaculture & Veterinary Science (CAVS), AIC also complements the Diploma in Veterinary Technology in aquaculture aspects and the Specialist Diploma in Aquaculture Management and Technology.

The Centre for Research & Opportunities in Plant Science (CROPS) is part of the Urban Agriculture Centre of Innovation (UACOI), a joint COI with Republic Polytechnic formed in 2022. With its unique capabilities in microbiome, seed germination and post-harvest technologies, CROPS is ramping up its support to the urban farming sector. With a suite of developed light growth recipes for vegetables, interested industry partners may find some ready solutions.

At the Centre for Urban Sustainability (CUS), multi-disciplinary efforts to promote zero waste and zero emission via waste valorisation have achieved significant milestones in mixed plastics, food waste technologies, water technology as well as strategic building materials. CUS supports the Centre of Innovation for Built Environment – Advanced Materials (COI BE-AM) jointly with Singapore Polytechnic and Republic Polytechnic. To augment its efforts in driving industry innovation, CUS houses a state-of-the-art 3D printer for cementitious materials.

With capabilities in applied nutrition, glycemic index research, food technology and future foods, the Centre for Applied Nutrition Services (CANS) has anchored support to the national Food Manufacturing Centre of Innovation (FMCOI). Jointly supported by Nanyang Polytechnic, Singapore Polytechnic, Republic Polytechnic and Temasek Polytechnic, FMCOI prepares the local industry to growth opportunities in alternative protein and food sustainability as well as supports scale-up initiatives. Our suite of kitchens and sensory evaluation, product development and characterisation laboratories facilitate the conduct of industry projects. TP also houses the region's only accredited facility for glycemic index testing - Glycemic Index Research Unit (GIRU).



# Centres are part of the national ecosystem e.g. Centres of Innovation (COIs)  
 \*\* APEC Centre for Sustainable Development in Agriculture & Fishery Sectors

Between May 2022 and April 2024, ASC was awarded 18 headcounts to leverage up our capabilities to foster and drive enterprise innovation and transformation. Working alongside our industry partners to develop holistic solutioning to their challenges, our centres bring skills application and competency mastery into our curriculum.

To facilitate project work which involves the use of human data or subjects, TP IRB has been established since 2014 to ensure the rights and welfare of human research subjects recruited to participate in research activities are protected. Similarly, TP IACUC was established to facilitate the use of animals in research and projects, ensuring all animal experiments comply with the National Advisory Committee for Laboratory Animal Research (NACLAR) guidelines.

# Advances in Halal Management Techniques and Food Science



Dr Rufaihah Abdul Jalil (far left) and Mr Sheng Ping (far right) showing learners how to operate testing machines for food quality analyses

Temasek Polytechnic and Warees Halal Limited (WHL) have launched the Fundamentals of Food Science and Halal Certification Management course, the first of its kind in Singapore for the Continuing Education and Training (CET) sector. Coupling halal management techniques with food science topics, TP aims to develop a sustainable skill ecosystem in the halal industry.

The course combines TP's expertise in education and training with WHL's experience as a leading provider of halal certification services. It covers the principles of food science, food microbiology, packaging and testing, as well as the requirements for halal certification. This unique approach has the potential to set a new standard for halal certification management courses and open up new avenues for learning and skill development in the halal industry.

The first launch of the course was conducted from March to April 2023, with learners from various sectors seeking to upskill their knowledge. The course was successful in developing the learners' interest in continuous learning, and they sought more information about other course offerings from Temasek Skills Future Academy (TSA).

In addition to supporting the development of halal professionals, this course has the potential to be delivered to the pre-employment training (PET) sector, providing individuals with valuable skills and knowledge that they can use to pursue meaningful and rewarding careers in the halal industry.

This collaboration with WHL represents a significant milestone in TP's efforts to support the growth of the halal industry. By working together with stakeholders in the halal industry, TP is committed to building a sustainable skill ecosystem that will benefit individuals, businesses, and the wider community.

# World Aquaculture Singapore 2022



ASC organising team led by Dr Jiang Fengli (third from right)

In co-operation with the Asia-Pacific Economic Cooperation (APEC) Centre for Sustainable Development in Agriculture and Fishery Sectors, CAVS co-organised the APEC Policy Partnership on Food Security (PPFS) Aquaculture Track at World Aquaculture Singapore 2022. This seminar showcased an array of innovative approaches and sustainable practices within the aquaculture industry.

The seminar featured a diverse lineup of local and international speakers, who presented on a range of topics aimed at addressing global food poverty and advancing sustainable aquaculture practices.

Mr Desmond Chow, Founder & CEO of Singapore Crawfish Pte Ltd, emphasized the transformative potential of land-based farming as a sustainable solution to world food poverty. Mr Jeffrey Tan, CEO of DishTheFish Pte Ltd, shared insights into the circle of sustainability within the seafood industry.

Dr Arefin Rahman from the Aquaculture Innovation Centre, Singapore, discussed the use of alternative lipid sources in Asian Seabass diet, highlighting the importance of innovative feed formulations for enhancing aquaculture sustainability.

Professor Freddy Boey, from the National University of Singapore, introduced material science innovations such as anti-thermal films and anti-bacterial coatings, showcasing technological advancements for improving aquaculture infrastructure.

Associate Professor Jennifer Blair of James Cook University explored opportunities for expanding the Northern Australian aquaculture industry, emphasizing the potential for regional growth and development.

Mr Glendon Teo from Temasek Polytechnic delved into microbiota diversity studies in recirculating aquaculture systems, shedding light on the importance of microbial ecology in aquaculture management. Dr Lim Yong Kian from Temasek Polytechnic, concluded the seminar by demystifying cultivated seafood and highlighting its role as a sustainable food source for the future.

Overall, the event provided a platform for knowledge exchange and collaboration among industry experts, researchers and policymakers, driving forward the agenda for sustainable aquaculture development in the Asia-Pacific region and beyond.

# Visit by International Guests - State of California, Chongqing Economic & Information Commission



Group picture with Ms Fiona Ma (front row, 6th from left)



Ms Luo Li (center) leading the Chinese delegation

**Ms Fiona Ma, Treasurer of State of California**, visited Centre of Innovation – Complementary Health Products in September 2023 with her team to understand Singapore’s CHP sector and to learn more about the technological advances and future trends. This can help bridge companies and capital to further the collaboration between Singapore and California, and across the United States. COI-CHP leveraged on this partnership to embark on new opportunities that supports the expansion of SMEs and internationalisation into the US market, particularly California. The visit included an overview of COI-CHP’s comprehensive range of capabilities as well as a tour of our specialized facilities. Enterprise Singapore shared their policies and programmes in place to support internationalisation for our SMEs. Other attendees include our TP BOG member, Ms Lisa Liaw and industry partners from ESG, AMEC Business Advisory Pte. Ltd., Natura Biotechnologies Tai Tong Ah Company Pte Ltd and Eu Yan Sang International Ltd.

After the official meeting between PM Lee and Mr. Yuan Jia Jun, China’s Communist Party secretary for Chongqing on 19 July 2023, a team of government officials, led by **Ms Luo Li, vice dean of the Chongqing Economic and Information Commission**, visited COI-CHP in November 2023. The visit focused on a potential collaboration to modernize and internationalize Traditional Chinese Medicine. Points of discussion included co-development of CHP as well as staff / student exchanges between Chongqing Liang Jiang New District, Chongqing College of Traditional Chinese Medicine, Natura Biotechnology Pte Ltd, and COI-CHP.

# Traditional Medicine Horizons

## Unleashing Potential, Expanding Frontiers

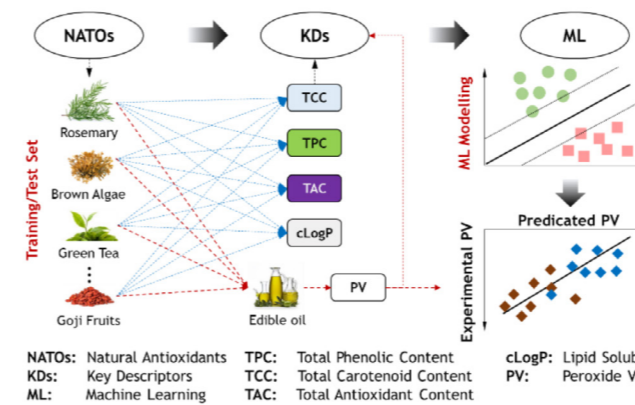
Co-organised by COI-CHP and Enterprise SG, this seminar was graced by three distinguished international speakers from Switzerland, Japan, and China who delivered insightful talks on cutting-edge analytical technology, the innovative journey of complementary health products in Japan and China.

Dr Tien Do, representing Camag, introduced the application of CHP quality control through the utilization of the new fully automatic High-Performance Thin-Layer Chromatography. Mr Kobayashi from JPS Pharmaceutical Co. Ltd., Japan, delved into the standardization and scientific evidence of Kampo products in Japan. Additionally, Prof Cai Bai Chang presented the approach towards innovation and standardization of Traditional Chinese Medicine in China.



Panel discussion – (L-R) Ms Koh, Mr Eu, Mr Hu and Dr Goh

The event drew the participation of 111 delegates. A panel discussion moderated by Dr Goh Lay Beng (ASC Director), Mr Richie Eu from Eu Yan Sang, Mr Dylan Hu from Poli Medical, and Ms Koh Bao Yue from ESG explored the role of innovation in expanding the global footprint of CHP. The lunchtime session provided a fruitful opportunity for further discussion and exchange of ideas among the attendees.



Chemical features (LogP, TAC, TPC, TCC, and PV) were used to establish machine learning models

The primary focus is on their ability to delay oxidation, assessed through peroxide values in edible oils exposed to heat treatment. The project involved 13 students in applied research.

Initial findings indicate a robust correlation between PV and key factors including TPC, TAC, TCC, LogP of the substitute, and the days of storage at 55°C, simulating accelerated oxidation. These findings provide a solid foundation for the development of antioxidant agents based on natural extracts, offering potential alternatives to synthetic ATOs in supplement preservation.

## Modelling for Prediction of Natural Antioxidant Efficacy

Natural antioxidants (ATOs), including rosemary and green tea, are healthier options to synthetic ATOs, and promising choices as food and supplement preservatives. The variability in chemical composition due to diverse cultivation and extraction methods poses a significant challenge. To address this, COI-CHP has embarked on a project which employs advanced machine learning techniques to systematically evaluate individual and combined ATOs based on key descriptors like total carotenoid contents, total phenolic contents, total antioxidant capacities, and lipid solubility.



# Advanced Materials for the Built Environment

The end-of-life management of non-biodegradable plastic waste is challenging because of its prevalence. The main issues in recycling plastics include the need for sorting and the presence of mixed and contaminated wastes. Recycling these plastics by processing and incorporating them into bituminous mixtures presents a viable solution, offering both environmental and economic benefits. This innovative approach not only reduces landfill use and the toxic emissions from incineration but also enhances the properties of bituminous mixtures, such as noise reduction and improved adhesion between bitumen and aggregates.

Supported by the National Environment Agency's (NEA) Closing the Waste Loop Initiative, TP has developed technology to repurpose mixed waste plastics into construction materials. A key innovation is the use of Near Infra-Red (NIR) technology, coupled with a comprehensive database of plastic signatures to ensure a consistent plastic composition. These plastics can then be tailored for the specific applications such as polymer modified asphaltic wearing courses and concrete footpaths.

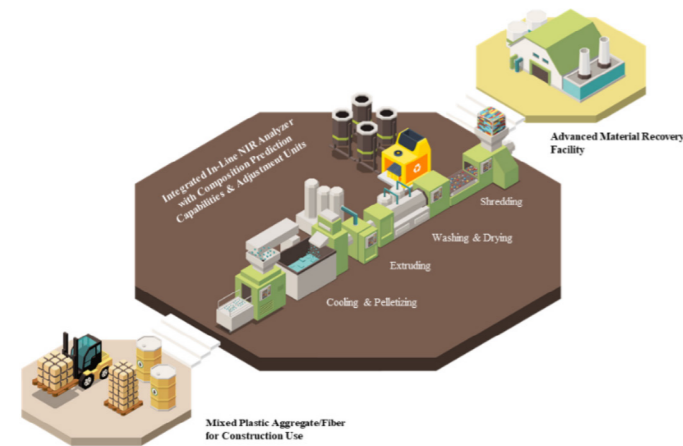


Illustration of Sustainable Process Design

Trials are underway to evaluate the practical applications of this technology. A CUS research team comprising students and staff has been working closely with Samwoh Corporation Pte Ltd to experiment with asphalt road pavement that incorporates mixed plastics polymer modified asphalt at Samwoh Smart Hub. The team is concurrently testing the use of mixed plastics aggregates in concrete footpaths. This project tackles the issue of plastic waste management and contributes to the sustainability of construction materials, showcasing a promising path towards more sustainable urban development.



Dr Wong Sook Fun (second from right), and Mr Kevin Lee (second from left) with Samwoh colleagues at the trial site

# Sustainable Pigments from Food Waste

The untapped potential of food waste was explored by CUS colleagues who transformed them into pigments for a variety of applications.

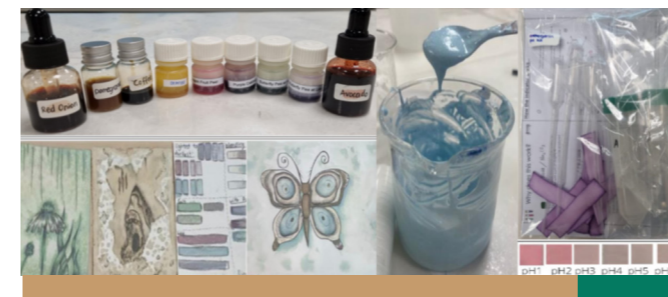
Two approaches were used in the investigation of the transformative potential of food waste. The first method involves directly extraction of pigments from food waste, harnessing the vibrant colours that are often overlooked and discarded. The second approach leverages food waste as a nutrient source to cultivate microorganisms capable of producing pigments. This project has successfully identified suitable microorganisms, opening new avenues for sustainable pigment production.

The extracted pigment from food waste was used for prototyping of personal care products, art kit and educational pH kit. The art kits and educational pH kits were used to engage young audiences to cultivate sustainability mindset. For cultivation of pigment-producing microorganisms, food waste medium was formulated to support the microbial growth in a cost-effective manner. New pigment-producing microorganisms were also discovered by the research team and their pigments was extracted for further investigation. The microbial pigment has potential to contribute to applications such as cosmetics, sustainable dyes, etc.

Overall, this effort showcased the feasibility of converting food waste into valuable resources, offering a new solution to waste reduction and promoting sustainability in various industries. In partnership with Century Global Pte Ltd, this project had provided hands-on training to students.



Isolation and identification of microorganisms from different fruit waste



Applications of the sustainable pigments



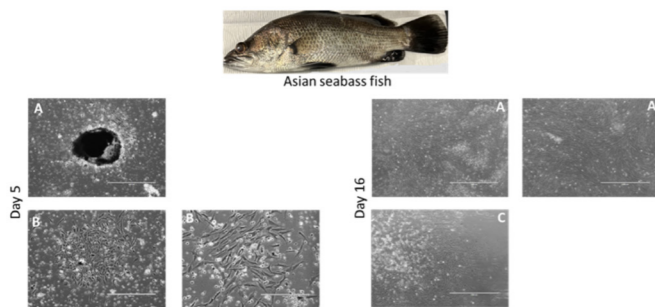
Project team led by Dr Miao Huang (far right) showcasing prototypes, including artwork made from the sustainable pigments

# Agri-food Innovations

## Developing primary cell culture from fish species

Fish primary cell lines have found widespread applications in various areas of fish biology and aquaculture research. They serve as valuable tools for studying the molecular mechanisms of disease pathogenesis and facilitate screening and evaluation of candidate vaccines and antiviral drugs. This contribution is instrumental to the development of effective disease management strategies in aquaculture.

Our researchers at Centre of Aquaculture and Veterinary Science and Future Food Domain conducted primary cell culture isolation in Tilapia and Asian seabass fish. Through effective research methodology, the team successfully cultured primary cells from tissues obtained from the kidney, spleen, and muscle tissues. The initial passages, the primary cell culture isolated from spleen and muscle cells of Asian seabass fish exhibited a diverse array of cell types. Moving forward, the team will carry out subsequent passages to maintain these morphological characteristics consistently over time. This approach will also be extended to other fish species. This work is within the scope of collaboration scope with Cellivate Technologies Pte. Ltd, aimed at exploring viable downstream applications in this field. By leveraging expertise in primary cell line isolation and characterisation, the team is poised to make significant contributions to advancements in fish biology, aquaculture, and related fields.



Photomicrographs of Asian seabass fish cells derived from (A) muscle tissue, (B) kidney tissue and (C) spleen tissue

## Enhancing germination rates and reducing hypocotyl elongation

The Centre for Research and Opportunities in Plant Science has developed innovative solutions for a local farm specialising in the cultivation of diverse leafy vegetables such as Xiao Bai Cai, Cai Xin, Pak Choi, Kai Lan, and Chinese Cabbage. Some productivity challenges the farm has been facing include:

- A 20% loss in seed germination due to poor seed germination rate.
- An additional 20% loss due to the slanting of seedlings with excessive hypocotyl growth

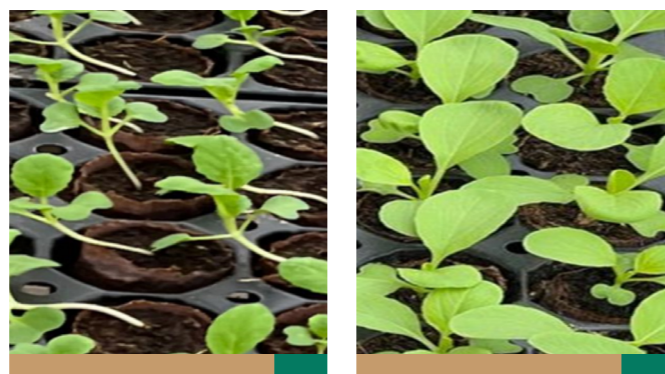
CROPS developed in-house novel technological solutions which were transferred to the farm to enhance their processes. The team successfully achieved:

- A germination rate of over 90%



Control germination      After treatment

- A reduction in hypocotyl



Control hypocotyl      Hypocotyl after treatment

# Making New Foods Together!

## Plant-based local hawker delights with Fuji Oil

To complement the plant-based food market's emphasis on Western cuisine, plant-based versions of local hawker delights were created at CANS. The collaborative team-consisting of TP students, research scientists, chefs and Fuji Oil experts-developed four innovative delights: No-MOO Satay, No-CLUCK Satay, Wow-gyu Rendang, and Shojin Laksa. These creations made use of Fuji Oil's advanced plant-based ingredients, including textured vegetable protein and high-moisture meat analogue, and combined them with local aromatic spices. This initiative not only brought traditional Singaporean flavours into the realm of sustainable eating, but also provided internship and employment opportunities for TP students involved in the project, gaining significant media attention.



Plant-based innovative delights

Building on this success, we launched a second project that used plant-based creamers to create an array of 16 plant-based dishes, ranging from traditional laksa to panna cotta desserts. This further foray into the potential of plant-based ingredients culminated in a culinary demonstration and networking session, co-organised with Fuji Oil. This event showcased the innovative applications of these ingredients and offered a networking platform for food industry professionals, scientists, and enthusiasts. The project team, which again included TP students, research scientists, and chefs, demonstrated the wide-reaching capabilities and versatility of plant-based ingredients in heritage and modern cuisine.

## Gelato Creations with O Happi Place

Two healthier range of gelato were created for O Happi Place. These gelatos focused on the integration of healthier ingredients into indulgent treats.

The first product, the Low-GI Chrysanthemum Pu Er Gelato, offers consumers the chance to enjoy a sweet delicacy without worrying about empty calories or rapid spikes in blood sugar levels. The second creation, a High-Protein Lychee Rose Gelato, addresses the nutritional needs of consumers seeking protein-rich alternatives in their diet, and is suitable for all age groups including the elderly.

Both gelatos have been successfully commercialized and are currently available at O Happi Place. This marks a milestone in the efforts of academia-industry partnerships in introducing food products that meet consumer needs and foster a healthier society at the same time. Furthermore, both gelatos gained public attention when featured in CNA's Talking Point segment "Is There Such a Thing as Guilt-Free Ice Cream?". This highlighted the public interest in and potential market for such innovative food products.

# FAO Mud Crab Expert Workshop



Mud crab experts and the AIC team led by Dr Lee Chee Wee and Dr Diana Chan (seated second and first from right in the front row)

The Aquaculture Innovation Centre, together with the Food and Agriculture Organization of the United Nations (FAO) co-organised and hosted an International Mud Crab Workshop from 27 – 30 November 2023. The Workshop was a closed-door event for mud crab experts and experienced farmers. Among the attendees were mud crab experts, producers and traders from Australia, Bangladesh, China, India, Indonesia, Japan, the Philippines Malaysia, Myanmar and Vietnam. Besides the intensive discussions on the latest mud crab trends, developments and strategic directions, the workshop experts were also involved in a field trip to visit the AIC R&D Farm in Neo Tiew Crescent and Oceania LLP.

Mud crab trends and development strategic directions or approaches were discussed, along with innovations and best practices for advancing the development of the mud crab industry worldwide. Technical papers documenting the proceedings, the discussions from the different regions and the strategies proposed are currently underway.



Colin Shelley, one of the steering committee members, speaking to the participants

# Aquaculture Health Hub

AIC focuses on closing the loop in sustainable super intensive aquaculture to enhance food security & resilience. Its key focus areas cover the various aspects of aquaculture comprehensively, and the centre looks into integration of smart technologies in supporting the industry.



Key focus areas in AIC

One key focus area of AIC is aquatic animal health and disease management. To help local aquaculture farms and enterprises manage the disease and health related issues, the Aquaculture Health Hub (AHH) was established in 2023. The purposely built Aquatic Biosafety Level 2 (AqBSL-2) facility has built-in tank systems with different tank capacities ranging from 0.2 ton to 1.0 ton and each tank is equipped with a standalone water recirculation system. Multiparameter sensors would be installed to allow real-time water quality monitoring and data recording for predictive analytics. AHH also houses BSL-2 compliant vaccine preparation and sample processing laboratories. These will enable efficiency evaluation and validation of aquaculture nutrition and health care products e.g., prophylactic, and therapeutic vaccines (oral, immersion, injectable), feed additives and water conditioners like probiotics, immuno-modulators, nutraceuticals, diagnostic point-of-care testing, etc.

The 300 m<sup>2</sup> facility provides opportunities for companies interested in evaluation or feasibility studies of products or technologies on aquatic health and disease management against disease pathogens and environmental stressors.



Unique aquaculture tank systems



Supporting laboratory equipment

# Singapore-Shizuoka Agri-Food Forum

Following a Memorandum of Understanding (MOU) between TP and the Shizuoka Prefecture in Mar 2019, TP led a Singapore delegation to visit Shizuoka in October 2019 to understand their Agrotech activities. The MOU was subsequently extended to Republic Polytechnic, Nanyang Polytechnic, Ngee Ann Polytechnic, and Institute of Technical Education (ITE). All parties aim to jointly develop and deploy technologies across Shizuoka and Singapore as well as facilitate collaborations in the agri-food arena.

The annual Shizuoka-Singapore Agri Food Forum (SSAFF) was started in 2020, and the 3rd forum (SSAFF3), themed “Agriculture 4.0”, was held in Singapore at ITE College East on 10 November 2022. Senior Minister of State Dr Koh Poh Koon graced the event as the Guest-of-Honour, and engaged the audience in a hybrid panel discussion session with Mr Jack Moy, CEO of Sustenir Agriculture, and Mr Shigeru Yoshida, Representative Director of NPO Shizuoka Organic Web. Mr Yoshida joined the session online. The session was moderated by Mr Eugene Toh, Director, Agritech, Enterprise Singapore.



Organising committee of SSAFF4

During the Japan trip, the Singapore team had the opportunity to join an educational tour organized by the Shizuoka team. The tour included visits to orange, wasabi, abalone and indoor factory plants.. The team also visited different universities and colleges, including Shizuoka Professional University Junior College of Agriculture and National Institute of Technology (KOSEN), Numazu College, to understand their learning culture in order to pave the way for future student and staff exchanges.



SSAFF4 Singapore delegation at Osaka Orange Orchard



(L-R) Mr Toh, Dr Koh and Mr Moy during SSAFF3 panel discussion

The theme of the 4th forum (SSAFF4) was “Advanced Technologies in Sustainable Agriculture”. The forum was held in Shizuoka Prefecture on 9 November 2023. Vice-Governor, Mr Takashi Mori, delivered the welcome speech. The forum saw 213 participants from both countries attending physically and virtually for the advanced agri-tech exchange.

# Rooftop Aquaponics

In collaboration with Metro Farm Pte Ltd, a rooftop aquaponic farm was set up in TP. This farm supports our farm-to-fork initiative and serves as learning and playing field for student-led projects. The skillsets acquired by students on the grounds of this farm include germination, transplanting, growth monitoring and harvesting of vegetables. Students also learned about the management of farm operations and the scaling and filleting of fish. The produce from this rooftop aquaponic farm is used as ingredients at some TP F&B outlets.



TP – Metro Farm Rooftop Aquaponics

Upholding the spirit of collaboration, TP supported the official opening of Metro Farm Aquaponics Farm at Downtown East on 24 September 2023. This opening was part of Pasir Ris-Punggol GRC’s ‘Green Wave’ carnival which attracted many visitors, including nearby residents. The carnival included various displays and exhibition booths, set up by Metro Farm and its partners. The guest-of-honour, Senior Minister Mr Teo Chee Hean, graced the event and interacted with the various groups at the booths. As a gesture of support, TP distributed to visitors more than 50 packs of vegetables, all of which were harvested from TP Rooftop Aquaponics.



Dr Wuang Shy Chyi (center) describing the work at TP to SM Teo and co-workers



Photo of SM Teo, representatives from People's Association and Metro Farm with TP team

# Safety Seminar for New Standards



Panelists engaging the audience in a lively discussion during the Safety Seminar

## Collaboration with Singapore Manufacturing Federation – Standards Development Organization

A safety seminar was co-organized by TP Total Workplace Safety and Health (TWSH) Committee and Singapore Manufacturing Federation – Standards Development Organization (SMF-SDO) to promote new standards including SS IEC 31010: 2021 on various risk assessment techniques and SS ISO 31000: 2018 on risk management guidelines. There were 138 external participants from 55 different organisations, and over 200 TP staff and students joined in the seminar.

The programme was packed with a total of eight industry experts, such as Mr Roland Teo (Head of Singapore/Southeast Asia Regional Advisory Group, Risk Management Society) and Ms Au Yong Hoi Wen (Head of Environment & Sustainability Division, Changi Airport Group). The experts shared their experiences on various topics of risk management.

- SS ISO 31000:2018 Risk Management-Guidelines: “Strengthening Organizational Risk Management Competency in Times of Uncertainty”
- SS IEC 31010:2021 Risk Management – Risk Assessment Techniques
- HAZOP: Insight for Practitioners

The sharing session extended to discuss how risk management technique could be used to evaluate climate risks (Evaluating Climate Risks and Resilience – Thresholds and Heat Maps in Relation to ISO 31010 and ISO 31000). With awareness of these new standards, safer work environments can be facilitated and achieved.

# Flavourful Wellness and Sports Nutrition

## Food & Beverage Trade Show 2024

As part of Enterprise Singapore’s Food Manufacturing Centre of Innovation, CANS showcased its capabilities at the Food & Beverage Trade Show 2024, held at Singapore Expo in April 24. The segment, titled ‘Flavourful Wellness: Foods You’ll Love for Healthier Living,’ was featured under the theme ‘Better for You’. CANS displayed a range of innovative staples, from pasta to cookies, guilt-free indulgence gelato, and brownies, as well as balanced and tasty Ready-to-Eat meals. Upcycled, dysphagia-friendly products made from fish waste were developed through collaboration with industry partners such as Rouquette, Aikit, Indus Biotech, O Happi Place, and Dish the Fish. The interactive blind taste test, comparing a regular brownie with a higher-protein brownie, was a hit among the delegates. Many, however, were unable to distinguish the effect of the additional ingredients in the brownie. This excellent showcase of innovation further expanded CANS partnerships with F&B and food manufacturing companies.



ASC team at Food & Beverage Trade Show 2024, led by Dr Kalpana Bhaskaran (far left)

## International Conference on Adaptations and Nutrition in Sports (ICANS2023)

TP hosted ICANS2023 from 19 – 21 July 2023. The event was jointly organized by Asian Nutrition Society for Sport and Health and International Society of Adaptive Medicine. Among the supporting partners were Asian Society of Kinesiology and Singapore Nutrition and Dietetics Association. With the theme “Maximising Human Potential in a Changing World”, ICANS2023 brought leading scientists, researchers, professionals and students from around the world together in engaging knowledge sharing sessions on sports nutrition, adaptations and muscle dynamics. The conference was a success and helped to forge new partnerships and opportunities beyond Singapore.



Coverage of ICANS2023



ICANS2023 finale picture

# Applied Science Shows

In line with the 2030 Agenda for Sustainable Development and Singapore Green Plan 2030, ASC Shows 2022 and 2023 were organized using a common theme, "Creating a Sustainable Tomorrow through Science". ASC's commitment to build a sustainable future through science is evident through our approach to develop creative and sustainable scientific solutions together with the industry.

## ASC Show 2022

ASC Show 2022 was a two-part event that took place in October and November through workshops, webinar and ASC facility tours and networking sessions.

The Discover and Learn workshop (for secondary schools), was held over three days, 19 – 21 October 2022. Students learnt how chemical engineering could create a sustainable future by looking at building with low-carbon materials and eco-friendly products. Other topics included microbiome for future health and feeding our future by transforming food waste into yummy food.



Sharing on how to turn plastics into useful materials at CUS

The webinar and ASC facilities tours/networking were held on 11 November 2022. Focusing on Sustainable Eco-System and Healthcare solutions, a panel of industry experts was invited to share at the webinar. The tours and networking sessions allowed ASC to showcase our facilities and explore collaborative opportunities with industry partners. Attendees enjoyed refreshments provided by Bistro Lab amidst a mini showcase set up by Werms Inc, Roquette Asia Pacific Pte Ltd and Cell ID Pte Ltd.



Sharing by Dr Edmund Tian (center, front-facing) on the innovative CHP projects



Secondary school students in action during the workshops

## ASC Show 2023

ASC Show 2023 was a one day event on Friday, 3 November 2023. There were two parts - a morning programme meant for our industry partners and an afternoon programme meant for secondary school students.

The engaging morning programme featured project showcases and informative sharing sessions by industry experts and ASC scientists. ASC Sustainability Team had a booth which demonstrated a real-time visualisation tool to estimate the saving of carbon footprint and trees based on their mode of transport to the Show.

The attendees could choose from five concurrent themes:

- Pragmatic Food Solutions for Sustainable Health
- Sustainable Agriculture and Food Production
- Health and Wellness through Wellness Products
- Sustainable Aquaculture and Veterinary Practices
- Technologies Towards Decarbonization



MOU signing between ASC, DES and NParks

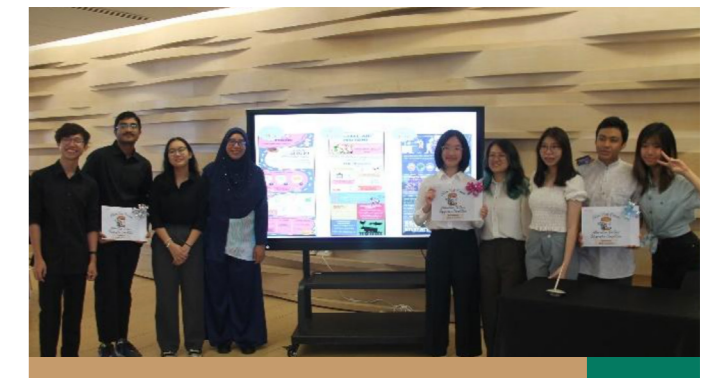


Brownie using pea protein, Lemon meringue okara tartlet, and mapo minced with steamed mini mantou using jackfruit meat

Attendees were treated to refreshments prepared by Bistro Lab in collaboration with Roquette Asia Pacific Pte Ltd (brownie using pea protein), The Soy Company Pte Ltd (lemon meringue okara tartlet) and Karana Foods (mapo minced with steamed mini mantou using jackfruit meat). Tasting portions was prepared to apply the principle of "REDUCE" to prevent waste during the tea break. Food waste generated was also collected for composting afterwards.

Highlights of the morning programme included the MOU signing between ASC, School of Design (DES) and National Parks Board (NParks) and the prize presentation ceremony for the winners of the Alternative Protein Infographic Poster Competition organized by ASC's Future Foods Domain.

In the afternoon programme, five Discover and Learn Workshops were offered to secondary school students. Hosted by ASC diploma courses and supported by ASC Centres, the workshops introduced the concept of sustainability in various domain areas.



Winners of the Alternative Protein Infographic Poster Competition



Using cellulose extract from fruit peels to make skin care products

# New Common Science Programme and Interdisciplinary Learning

Through regular reviews and updates, ASC ensures that its curricula are industry-oriented, robust and skills-based. That way, graduates are equipped with strong technical competencies, generic and transferable skills. Through the curriculum change of AY 2023, the launch of the Common Science Programme (CSP) and the revamp of the Year 3 Elective Clusters (ECs) were carried out.

The CSP was introduced to align with MOE's directive, which is to provide greater flexibility and multiple academic pathways for students to discover and develop their interests and strengths before deciding on a specific diploma course to pursue for the remaining two years in the polytechnic. Taken by all ASC students, the CSP is offered over two semesters and encompasses all five ASC diplomas. This provides students with ample time and opportunities to acquire foundational skills and gain exposure to the different domains through a multidisciplinary curriculum and structured education and career guidance activities including learning journeys, industry talks and taster lessons etc.

This common curriculum equip students with a strong foundation in Science, Technology, Engineering and Mathematics (STEM) as well as a holistic understanding of the relevancy of these foundation subjects and their application in the various applied science disciplines. Students can then better appreciate the interdisciplinary nature of the industries in their day-to-day work. Beyond technical knowledge and skills, an interdisciplinary approach also fosters critical thinking, problem-solving skills, adaptability and an innovation mindset amongst our students, preparing them for the future workplace. Notably, students had their first exposure to interdisciplinary learning they worked in diverse groups to create innovative solutions or prototypes using the design thinking framework learnt in the subject "Innovation & Entrepreneurship" to tackle a problem statement that was issued in their "Nutrition & Health" subject.

To further provide flexibility to ASC students in their academic pursuit, students in Year 3 can choose from a list of industry-aligned ECs offered by any diplomas in the school. The ECs aims to deepen students' knowledge and skills in an area of specialization related to one of the five diplomas, after which students will complete their internship and major project aligned to their selected EC. ASC currently offers a total of 16 ECs, including the following new ECs - Technical Sales and Marketing, Future Foods Technology and Cardiology Technology. ASC regularly reviews the list of ECs offered to our students in response to industry trends and needs.

To facilitate authentic learning and better prepare students for their internship, and subsequently, the workforce, an integrated approach is used to deliver the EC subjects to provide students with a holistic understanding of the industry as they appreciate how different industry sectors are interconnected. Competency-based learning, case-based learning and work-based learning are amongst the teaching and learning approaches used to enhance students' learning. Our diplomas' curriculum develop our ASC students as agile and versatile learners and provide them with different pathways to explore their interests and passion.

# Design Thinking and Innovation

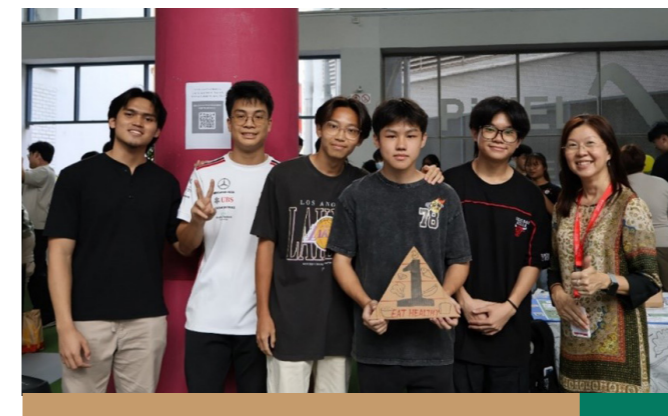
## NuH x INNOVA

All ASC first year students would experience interdisciplinary learning (IDL) in an integrated project between two subjects: Nutrition and Health (NuH), and Innovation & Entrepreneurship (INNOVA). Students were challenged to apply the nutrition and healthy knowledge acquired from NuH & design thinking process learnt from INNOVA to solve important nutrition and health problems in Singapore. Topics included weight management for teenagers, sodium reduction and nutritional needs for the elderly.

Students' abilities in problem solving, teamwork, creativity and presentation skills were assessed at the finale roadshow on 2 February 2024, where they showcased their solutions and prototypes. Some of the displayed innovation include:

- Creation of a vending machine that sells customisable protein smoothie drinks for gym goers and muscle builders to provide optimal nutrition for muscle building
- Use of a mobile phone app to estimate the sodium amount based on pictures of food. The app will give a warning should the sodium exceeds the recommended limit
- Creation of a portable "healthy plate" with a weighing sensor to estimate its proportion of grains, meat and vegetables. The data can be tracked via a mobile phone app

A total of six groups of students received prizes including the Best Overall Project and Best Booth Design prizes. These prizes included medals made from recycled material as well as NTUC vouchers.



Prize winners with Dr Goh Lay Beng (far right)



Education Minister, Mr Chan Chun Sing, at the RHBHacks stall managed by Team 3R

## Mapletree-SCCCI River Hongbao Hackathons (RHBHacks)

RHBHacks is an annual event for students and youth entrepreneurs to reinterpret everyday objects or products that will make our lives greener. During the Hackathon, the proposals are evaluated and judged by a panel of industry experts on the criteria of feasibility, strategy, innovation and the Singapore identity. The theme in RHBHacks 2023 is "Reimagining Green Living", which aims to inject a pragmatic dimension into an environmentally responsible lifestyle through novel and practical ideas or products for consumers.

Team 3R comprising of three Medical Biotechnology students had emerged among the top 4 finalist's teams for the RHBHacks 2023 and eventually clinched also the Best Stall Operator Award. Congratulations to Team 3R for this notable achievement!

# Healthier Choices in Customized Diets

## Enabling Lives Festival

What to do with your expertise in food, nutrition and culinary science? Put it to good use to benefit others, of course.

That is what three students from the Diploma in Food, Nutrition & Culinary Science, Desiree Loh, Britney Song and Genevieve Lee, did. Collaborating with SG Enable and Metta Café, these students co-created a workshop for SG Enable's Enabling Lives Festival 2022, to celebrate International Day of Persons with Disabilities. These students used their expertise in food, nutrition and culinary science to develop a healthier Christmas bar and teabags with functional ingredients. They also facilitated the workshop with apprentices from Metta Café, who were persons with disabilities. Through this opportunity, the students were able to use their technical experience and skills to collaborate in this meaningful programme to serve the community.



ASC students with collaborator from Metta Café

## Renal Rhythms, Active Wellness Wok!

The inaugural cooking competition, Cook-off, marked a significant milestone in community engagement and culinary education on 26 January 2024. A collaboration between National Kidney Foundation (NKF), CANS and FNC, students took good management of kidney health into consideration as they showcased their culinary skills. The champion team, comprised of Bryant Wong, Sherrie Teong and Serphine Lau, demonstrated exemplary culinary prowess with nutritional knowledge in a fusion dish.



Winning dish: Zesty Barramundi Thai Noodle Fusion and Blueberry Lemon Cloud

On 12 April 2024, Chef Gary Lim and the winning student team of Cook-off, conducted a cooking demonstration of their winning dish. At the event, dietary and cooking tips for dialysis patients and other wellness tips from exercise specialists and occupational therapists were shared.

NKF's appreciation for the collaboration highlighted the competition's success in fostering community spirit, enhancing culinary education, and promoting awareness of kidney health through proper nutrition.

# WorldSkills Singapore and WorldSkills Competition

WorldSkills Singapore (WSS) is a national skills competition held biennially to discover the best in talents among Singapore youths in various vocational skills. Outstanding performers of WSS will represent Singapore to compete in the prestigious international-level WorldSkills Competition (WSC). Being the gold standard of skills excellence, WSC inspire youths to turn their passions into meaningful careers.



Team ASC at WSS 2023

In ASC, the Water Technology Domain looks into waste water treatment and has developed technologies in aquaculture used water and hazardous chemical waste treatments. More recently, the domain has focused efforts on environmental management for circular economy and sustainable biofuels production. Leveraging on our staff expertise, TP has prepared our students well for WSS in the skill area of Water Technology.

After rounds of internal selection, Teo Jun Yang Jonathan proved himself a worthy competitor by mastering different skills in Water Technology. The rigorous training provided by team of coaches from the Water Technology Domain, and Jonathan's dedication to his craft led to him clinching the Gold Medal in WSS 2023 in the skill area of Water Technology. This was a first for the school. Jonathan is concurrently training tirelessly with coaches, with intensive industrial stints at the Public Utilities Board (PUB) as well as overseas. He will represent Singapore in WSC 2024 in Lyon, France in September.

Another student, Tan Xian Xun, won a Medallion of Excellence in WSS 2023 in the skill area of Chemical Laboratory Technology. Xian Xun was trained by a team of coaches from COI-CHP.



Teo Jun Yang Jonathan



Tan Xian Xun



# Partnership with Healthcare Institutions

## International Pathology Day 2023

The International Pathology Day 2023 was a captivating event that showcased the diverse and dynamic field of Clinical Pathology. Hosted by the Singapore General Hospital (SGH), one of the event highlights was the hands-on activities facilitated by our students from the Diploma in Medical Biotechnology (MBT) who did their internship with SGH. Participants had the opportunity to observe Histopathology specimens under a microscope, understand microorganisms in microbiology bacteriology, and even simulate blood typing and compatibility testing in blood banking, along with an exploration of the types of blood tubes used in Clinical Laboratories. These interactive experiences enhanced their understanding and fostered a sense of curiosity and excitement among attendees. Beyond the informative exhibits, the event served as a platform for collaboration and knowledge exchange. Our MBT interns shared their experiences and perspectives, while attendees had the opportunity to engage with medical professionals and gain valuable insights into career paths in clinical pathology.



Mr Alvin Poh (second from left) and Ms Louisa Chew (far right) with MBT students who were managing the event booth

## Use of AI, Metaverse and Podcasts in Pharmacy Training

Staff and students from the Diploma in Pharmaceutical Science worked closely with the Division of Pharmacy at SGH. The team explored the use of AI in health information, the use of Metaverse in health education as well as the use of podcasts in the pharmacy staff education and training. Through industry attachment, staff members had the opportunity to embark on a learning journey to acquire knowledge in the current practices in the industry and engage the various stakeholders in the pharmacy to identify potential growth areas and upskilling opportunities to plough back into student training and education.

## Clinical Cardiology

To support the projected growth in employment growth for cardiovascular technologists in the coming decade, ASC has started a new elective cluster in Cardiology Technology. A cardiovascular technologist needs to perform cardiac diagnostic procedures, including administration of electrocardiogram, echocardiogram and other tests to diagnose heart disease.

Dr Chan Giek Far, MBT Course Chair, undertook a stint with Asian Heart & Vascular Centre, Mount Elizabeth Novena Hospital & Specialist Centre, to understand the various procedures in cardiovascular health. Dr Zhang Pengchi, Senior Academic Mentor, went on a 3-month overseas attachment with Guangxi Medical University to gain proficiency in various echocardiographic techniques. These industry engagements enhanced their expertise and practical skills, which were crucial in the curation and development of the subject, Clinical Cardiology. The team has also identified suitable training tools, clinical attachment and internship training opportunities to facilitate student learning in performing cardiac diagnostic procedures.

# Reaching Out to the Community Through Service Learning

Student leaders from the Diploma's Interest Group, Totally Pharmaceutical Science (TOPS), crafted various community service projects with the nation's agenda in mind. They merged the project planning process with Guided Learning module, and expanded some projects to become cohort-wide activities in LEADACT module for Level 2 Pharmaceutical Science students



TP staff and students with preschoolers

## Mozzie Flee! Mozzie Free!

The community project, in collaboration with 7oaks Preschool Bedok Reservoir and Tiger Balm Singapore, took place on 27 January 2023, aligning with national efforts to combat increased dengue cases in Singapore. The project successfully engaged around 50 preschool students, raising awareness about dengue prevention practices.



TP students teaching preschoolers about oral and hand hygiene

## Healthy Living in the Community

Aligning with MOH's Healthier SG initiative, the interest group educated 50 pre-schoolers at 7 Oaks Preschool on 24 July 2023, teach them the role of oral and hand hygiene on preventing Hand, Foot and Mouth Disease (HFMD). In addition, the group also reach out to around 40 elderly individuals at Tampines Care Home on 25 July 2023. The group conducted three 1.5-hour sessions for these elderly, focusing on proper wound care to prevent infections and adverse health effects.



Outreach participants at Queenstown Community Centre

## Your Health, Our Priority!

Aligned with the Healthier SG agenda, our community outreach event on "Navigating Medication Compliance for a Healthier You" took place at Queenstown Community Centre on 21 October 2023. In collaboration with Fei Yue, Diploma in Food, Nutrition & Culinary Science's interest group, and Fitness Through Science (FITS) interest group, the event focused on educating the audience about medication management, healthy eating, and exercise. These topics were also addressed within the TP community on 24 October 2023, with expert speakers providing valuable knowledge and advice.

# The New Integrated Chemical Pilot Plant

The integrated Chemical Pilot Plant (CPP) was built based on industry standards to offer relevant training for students from the Diploma in Chemical Engineering. This new plant was specially redesigned and arranged under four sectors: Biodiesel Production, Wastewater Treatment, Safety Training Sector and Distributed Control Room. The Biodiesel Production sector includes esterification/transesterification, separation, purification and recovery units involved in the conversion of waste cooking oil to biodiesel. The Wastewater Treatment sector covers a comprehensive suite of pre-treatment, secondary and tertiary units equipped with complete instrumentation for precise monitoring and control. At the Safety Training Sector, Work-at-Height and Confined Space teaching platforms are put in place to emphasize good workplace safety practices. The Distributed Control Room features a central network of computer-based workstations to monitor and remotely control all processes. Equipped with industry-relevant facilities and augmented reality (AR) learning facilitation, the plant provides meaningful and immersive hands-on training for students.



Mr Chan Kah Meang (in blue) showing students (in orange plant uniforms) the various equipment components using AR

In a collaboration with Alpha Biofuels Pte Ltd, waste cooking oil (WCO) was converted to usable biodiesel in CPP, via a multi-stage process. Firstly, WCO undergoes pre-filtration to remove impurities. This is followed by esterification to reduce the free fatty acid content. Transesterification then occurs, where alcohol reacts with treated WCO in a catalysed reaction to produce biodiesel and glycerol. This waste-to-resource process is one example of sustainable energy solution. The plant also supports capability building in sustainable water treatment and waste valorization, in the move towards environmental stewardship and sustainability.



Biodiesel production system (top) and AR learning for ion exchange column (bottom)



# Lifelong Learning with Sustainability Courses

As Singapore becomes increasingly committed to its economic growth pillars – the Digital Economy, Green Economy and the Care Economy – the demands for job roles that require green skills across multiple sectors are growing exponentially. In addition, the rise of fast fashion has come with significant environmental implications. As sustainability becomes a more pressing issue, the fashion industry is starting to rethink its approach and embrace sustainable fashion.

The **Specialist Diploma in Sustainable Built Environment** and the **Specialist Diploma in Sustainable Fashion** are cross-school collaborations between ASC and TP's School of Design. In particular, the Specialist Diploma in Sustainable Built Environment was launched with the signing of a Memorandum of Understanding in collaboration with the Building & Construction Authority Academy.

Recognising the gravity of environmental concerns, many green initiatives have been introduced at a rapid pace in recent years. The Singapore Green Plan 2030, a whole-of-nation movement for sustainable development, was spearheaded by multiple ministries and focuses on five key pillars, with Energy Reset being one of the pillars. The **Specialist Diploma in Environmental Technology & Energy Sustainability** was launched to meet the growing demand of trained professionals as part of Singapore's green initiatives, especially in the areas of environmental care and energy sustainability. The programme has been granted provisional accreditation for the Associate Singapore Certified Energy Manager (ASCEM) with the full accreditation expected after the first course run.



Dr Syed Musthaq (far left) conducting practical briefing to SDAMT learners



Ms Siti Saifa (standing) facilitating the inaugural run of "Future Foods and Sustainable Nutrition" in March 2024

In line with Singapore Food Story to enhance local food production, ASC has launched two programmes to support talent training for the aquaculture industry. The **Specialist Diploma in Aquaculture Management & Technology (SDAMT)** aims to equip working adults with the skills and knowledge in aquatic animals and optimizing aquaculture operations through technology and responsible practices. The short course, **Urban Aquaculture**, provides just-in-time and flexible learning through on-the-go, bite-sized e-learning sessions, which are complemented with hands-on training sessions. Learners who have completed this Urban Aquaculture course can move on to complete SDAMT in just one semester instead of the usual two semesters.

In another new short course "**Future Foods and Sustainable Nutrition**", participants get to learn the latest advances in food production, food processing, as well as the innovative ingredients and culinary techniques used to produce future foods such as plant-based meat, cultivated meat, and novel proteins from insects, algae and fungi. The social, economic, nutritional and environmental aspects of future foods was also discussed.

## Empowering Veterinary Professionals



*Happy and satisfied programme participants*

Between 2022 and 2023, ASC partnered with Mars Veterinary Health to develop and execute two programmes aimed at enhancing the knowledge and skills of veterinary nurses and pet care assistants.

The first initiative, the Reassessment Campaign on Veterinary Resuscitation (RECOVER) Basic Life Support and Advanced Life Support Certification programme was successfully conducted on 8 – 9 September 2022. Designed to equip veterinary professionals with essential life-saving techniques, the RECOVER programme is the only certified course endorsed by the Veterinary Emergency and Critical Care Society that addresses the critical need for standardized emergency response protocols in animal healthcare.

Following this, the inaugural run of the Pet Care Assistant Level 1 Course, co-developed by ASC and Mars Veterinary Health, was conducted from 28 February to 27 April 2023. This comprehensive training programme aims to empower individuals aspiring to enter the field of veterinary care with fundamental knowledge and practical skills. From animal handling and basic animal husbandry to assistance in medical, participants were provided a curriculum tailored to meet the evolving needs of modern veterinary practices.

Both initiatives represent a significant step forward in our shared mission to advance animal healthcare through education and innovation. By collaborating with Mars Veterinary Health, ASC strives to set a new standard of excellence in veterinary education, ensuring that pet care assistants are equipped to provide high-quality support to veterinary teams and pet owners alike.



*Ongoing resuscitation!*

## Paws for a Cause 2023

'Paws for a Cause 2023' served as a vibrant platform to advocate for conservation and responsible pet ownership with a clear mission to raise awareness about wildlife conservation and responsible pet ownership practices. Through engaging talks and interactive sessions who took place from 26 – 28 April 2023, attendees learned about the significance of protecting our natural environment and caring for animals. The event also provided a valuable platform for organisations to raise awareness among TP students and staff and to promote conservation efforts. Partners such as Mandai Wildlife Group, SEA Aquarium, the Singapore Wildcat Action Group, and Conservation International delivered insightful presentations, raising awareness about their initiatives. By facilitating meaningful discussions and fostering connections between participants and industry experts, the event created opportunities for individuals to take on a more active role in promoting environmental stewardship and animal welfare.

Over the three days, Paws for a Cause 2023 received tremendous support from industry partners and TP student volunteers. The event began with an engaging opening session featuring talks on wildlife and environmental conservation. Volunteers from the Diploma in Veterinary Technology and industry partners such as the Singapore Prevention of Cruelty to Animals (SPCA), set up information booths at the TP concourse, and shared much about wildlife and pet care. The event concluded with insightful talks by NParks and the House Rabbit Society Singapore (HRSS) on responsible pet ownership and rabbit rescues in Singapore. The success of Paws for a Cause 2023 was evident in its ability to engage close to 500 participants across the three days.

Reflecting on the impact of 'Paws for a Cause 2023', ASC remains committed to advancing responsible pet ownership and look forward to future initiatives that will further promote sustainability and animal welfare within our community.



*Informative sharing at the booths*



*Audience engaged in environment conservation sharing*

# Students in the Community

Applied Science Studies Club (ASCSC) supports the growth and development of ASC students and believes in making a difference in their lives. This dynamic group, led by full-time ASC students from various diplomas, actively organises projects that address a wide range of issues from individual concerns to national challenges. Many of these projects involve collaborative efforts among ASCSC student leaders and the wider community beyond TP such as organising a hackathon on sustainability with other student groups.

One important highlight was ASCares in 2024, a community-based healthcare education carnival. Organised by ASCSC, the carnival was supported by the Lively Places Programme, a joint initiative by Housing & Development Board and Urban Redevelopment Authority to better support community-led efforts in enlivening Singapore's public spaces. DPM Mr Heng Swee Keat and Deputy Speaker of Parliament, Ms Jessica Tan graced the event as Guest of Honour and Special Guest respectively.

The carnival featured informative and relevant talks by healthcare professionals and ASC lecturers Dr Zhang Pengchi and Ms Loh Win Nie. There were interactive games and mass workouts to make the learning experience engaging and enjoyable for all attendees, especially the senior citizens in Bedok and Tampines estates. The students' empathy and care lightened the hearts of the senior citizens. Overall, ASCares showcased the collective efforts of ASCSC towards community welfare and bonding.



DPM Heng Swee Keat (GOH) and Deputy Speaker of Parliament Ms Jessica Tan (Special Guest) with elderly from Sunlove Nursing Home at ASCares



DPM Heng, Ms Jessica Tan and TP students led by Mr Tan Keng Beng (far right)

# Student Achievements

## AY22/23 Academic Awards

Academic Award	Diploma in	Name of Student
A*STAR Science Awards (Polytechnic)	Medical Biotechnology	Ho Jia Huey
	Medical Biotechnology	Tan Zhi Hui Jensen
	Pharmaceutical Science	Phua Xing Yi
	Chemical Engineering	Tsumura Kenzo Sean
CapitaLand Award for All-Round Excellence	Medical Biotechnology	Tang Yu Alexandar
Course Gold Medal - AMILI	Medical Biotechnology	Clara Yang
Course Gold Medal - Changi General Hospital	Pharmaceutical Science	Lee Si Ling
Course Gold Medal - Malaysia Dairy Industries	Food, Nutrition & Culinary Science	Tan Qing Fang
Course Gold Medal - Singapore Chemical Industry Council	Chemical Engineering	Chen Yi Hui
Course Gold Medal - Singapore Veterinary Association	Veterinary Technology	Emily Poh Jia Wen
Max Lewis Scholarship	Medical Biotechnology	Sneha Chetan Patel
MOH Healthcare Merit Award	Food, Nutrition & Culinary Science	Nadine Wong Yun Leng
	Food, Nutrition & Culinary Science	Lee Yue Er, Lois
	Pharmaceutical Science	Deslyn Chan Jia En, Deslyn
	Pharmaceutical Science	Lee Jia Sin, Joelyn
	Medical Biotechnology	Terina Tay Yan Wen
Select Group Study Awards	Veterinary Technology	Leanne Leow Wan Hui
	Food, Nutrition & Culinary Science	Kathleen Tah Kai Lin
Takeda Manufacturing Scholarship	Food, Nutrition & Culinary Science	Jovan Lee Jun Qi
	Pharmaceutical Science	Josephine Wee Yi Ling
	Medical Biotechnology	Teo Sheng Yong Ayrton
The Daisy Phay-TP Foundation Scholarship	Chemical Engineering	Soh Li Qi
	Food, Nutrition & Culinary Science	Vanness New
The Lee Kong Chian Scholarship	Pharmaceutical Science	Low Xin Tian, Tammy
	Food, Nutrition & Culinary Science	Lavonne Low Yen Qing
The Lee Kuan Yew Award (best in STEM)	Medical Biotechnology	Clara Yang Ting
The Ngee Ann Kongsi Scholarship	Medical Biotechnology	Yasmeen Fathima D/O Haja Shafiudeen

# Student Achievements

## AY22/23 Academic Awards

Academic Award	Diploma in	Name of Student
TP Scholarships	Chemical Engineering	Muhammad Harith Bin Mohd Badrul Hisham
	Food, Nutrition & Culinary Science	Lim Rui Xuan Lecia
	Medical Biotechnology	Leow Yu Xuan Valencia
	Pharmaceutical Science	Abdul Malik Fazeela Fathima
	Veterinary Technology	Ng Shern Tien Shawn
TP CCA Scholarships	Veterinary Technology	Chenoa Bo Kannan
	Veterinary Technology	Chan Jia Yin
	Veterinary Technology	Owain Chong Boon Khai
	Medical Biotechnology	Quoh Wei Jun Brandon
	Pharmaceutical Science	Safiya Khatoon
	Pharmaceutical Science	Low Lee Zhit
TP Skills Mastery Awards	TP Skills Mastery Awards	Low Xin Tian, Tammy
	TP Skills Mastery Awards	Tan Sean Ying

## AY22/23 Competitions

Academic Award	Award	Diploma in	Name of Student
American Concrete Institute-Singapore Chapter Project Competition	Bronze Award	Chemical Engineering	Loh Kim Guan
Inter-school Science Competition	Individual Challenge (Distinction)	Medical Biotechnology Medical Biotechnology	Kent Chu Yong Kang Ezzra Md Mohideen
	Individual Challenge (Merit)	Medical Biotechnology Veterinary Technology	Anne Margaret Goh Siew Jing En Ally
Mapletree-SCCCI River Hongbao Hackathon	First Prize	Medical Biotechnology	Beh Shi Wei Laurent Lim Jia An Tan Jun Yong
SALAS Annual Scientific conference Poster Competition	First Prize Second Prize Third Prize	Veterinary Technology Veterinary Technology Medical Biotechnology	Coey Tang R Hemma Dharrshini Justin Choo Rongze
Sembcorp Marine's Green Wave Environmental Competition	First Prize	Chemical Engineering	Muhammad Aqil Bin Mohd Azhar Muhammad Elias Bin Faizal
The Young Scientists' Symposium	Merit Award	Medical Biotechnology	Tang Yu Alexander Kent Chu Yong Kang
	Merit Award	Veterinary Technology	Angel Joy Seah Coey Tang

# Student Achievements

## AY22/23 Others

Academic Award	Diploma in	Name of Student
GIC Sparks Awards (Community Service)	Medical Biotechnology Veterinary Technology	Hannah Emilia Rustam Effendy Tan Xin Jie Amanda
TP Sportsperson Excellence Award	Veterinary Technology Food, Nutrition & Culinary Science	Glen Lim Jun Wei Jordan Ryan Wong
TP Service Excellence Award	Medical Biotechnology Veterinary Technology	Quoh Wei Jun Brandon Sasha Anisha Kumar
TP Student Leader Excellence Award	Veterinary Technology	Chan Kai Min Stella

## AY23/24 Academic Awards

Academic Award	Diploma in	Name of Student
ACI (Singapore Chapter) Scholarship	Chemical Engineering	Aloysius Cheok Qi En
A*STAR Science Awards (Polytechnic)	Medical Biotechnology	Alifah Ilyan Binte Jamal
	Medical Biotechnology	Elijah Ang Kai Jie
	Food, Nutrition & Culinary Science	Serphine Lau Su Fang
Course Gold Medal – Singapore Chemical Industry Council	Chemical Engineering	Tsumura Kenzo Sean
Course Gold Medal – Tung Lok Group	Food, Nutrition & Culinary Science	Teong Yuan Yi, Sherrie
Course Gold Medal – Khoo Teck Puat Hospital	Medical Biotechnology	Clayton Chu Jia Teng
Course Gold Medal – Changi General Hospital	Pharmaceutical Science	Tan Xian Xun
Course Gold Medal – Mandai Wildlife Group	Veterinary Technology	Anatasia Sim
MOH Healthcare Merit Award	Medical Biotechnology	Anne Margaret Goh Yun Hu Ong Choon Cheng Toh Hui Ping
	Pharmaceutical Science	Han Ci En Joann Lau Yi Ern Low Xin Tian Tammy Tay Yi Jie, Ian Wilson Chan Weisheng

# Student Achievements

## AY23/24 Academic Awards

Academic Award	Diploma in	Name of Student
<b>Max Lewis Scholarship</b>	Pharmaceutical Science	Tan Yi Hong, Rick
<b>National Parks Board-Peter Lim Scholarships</b>	Veterinary Technology	Cheong Kwok Woor Chong Min Yee Kyra Emma Maria Binte Rahmatullah Khan Goo Yu Min Summer Ariel Har Chee Cheng Lee Wee See, Rayna Mi'ra Mikkil Binte Muhamad Hidayat Ng Shi En Nur Amira Binte Mazlan Ong Yu Jie Poh Xu Wei Raphael Shermaine Tan Rui En Tan Yi Xuan Tok Jin Wen Ginelle Wong Yoke Wah, Dora
<b>Ng Teng Fong General Hospital Scholarship</b>	Food, Nutrition & Culinary Science	Tang Xuan Lin
<b>SgIS Scholarship</b>	Chemical Engineering	Goh Jun De, Elton
<b>SINDA Excellence Award</b>	Medical Biotechnology Veterinary Technology	Ezzra Md Mohideen Sasah Anisha Kumar
<b>Stanley-Fu Steadfast Associates Scholarship</b>	Pharmaceutical Science	Lexna Neo Rui Xi
<b>Takeda Manufacturing Scholarships</b>	Chemical Engineering Medical Biotechnology Pharmaceutical Science	Low You Liang, Lucus Geraldine Sim Yihui Zechariah Wa Ca Joon
<b>Temasek Foundation – Union Scholarship</b>	Medical Biotechnology	Soh Yin Jun
<b>The Daisy Phay TP Foundation Scholarship</b>	Chemical Engineering Pharmaceutical Science	Lim Xu Cong Tan Rui Qi
<b>The Lee Kong Chian Scholarship</b>	Food, Nutrition & Culinary Science	Teong Yuan Yi, Sherrie
<b>The Lee Kuan Yew Award</b>	Pharmaceutical Science	Tan Xian Xun
<b>The Ngee Ann Kongsi Scholarship</b>	Medical Biotechnology	Goh Kai Jun Benedict

# Student Achievements

## AY23/24 Others

Academic Award	Diploma in	Name of Student
<b>TP Scholarships</b>	Food, Nutrition & Culinary Science Medical Biotechnology Pharmaceutical Science Chemical Engineering Veterinary Technology	Ang Pei Ting Charlotte See Yi Yew Nathan Thandi Myint Aloysius Cheok Qi En Liv Erica Lim
<b>TP CCA Scholarships</b>	Chemical Engineering Food, Nutrition & Culinary Science Medical Biotechnology Medical Biotechnology Medical Biotechnology Pharmaceutical Science	Nicole Ng Jess Phoon Rui Ying Hailie Renee Alanguilan Pimentel Koh Liling Jolin Nur Aisyah Bte Hanafi Shanice Lum Bei Xin
<b>TP Skills Mastery Awards</b>	Chemical Engineering	Teo Jun Yang Jonathan

## AY23/24 Competitions

Academic Award	Award	Diploma in	Name of Student
<b>Antimicrobial Resistance Innovation Challenge</b>	2nd Runner-up	Pharmaceutical Science Pharmaceutical Science Pharmaceutical Science Pharmaceutical Science Medical Biotechnology	Faith Wong Ya Wen Sampujaa Naidu Ramasamy Felicia Chan Cheng Sheun Sandhya Saad Janjua Avaneesh Selvamani
<b>Green Wave Environmental Care Competition</b>	Silver Award	Chemical Engineering	Nurul Hidayah Bte Yahaya Low You Liang Lucus Aloysius Cheok Qi En Glynis Seow Yu Shan
	Merit Award	Chemical Engineering	Chua Yi Ting Ryan Iyer
<b>Singapore Institute of Food Science and Technology Quiz Bowl competition</b>	2nd Runner-up	Food, Nutrition & Culinary Science	Lavonne Low Yen Qing Ong Si Ying Jolene Sivanesh S/O Ganesh Sharon Koh Xuan En
<b>Science Buskers Festival (Tertiary/ Open category)</b>	Champion	Veterinary Technology	Huang Yunqin Faith Yeow Jassie Png Keat Yi Ganrielle
	2nd Runner-up	Common Science Programme	Divyana Bisht Tamilselvam Tharanni Tan Yu Xuan

# Student Achievements

## AY23/24 Academic Awards

Academic Award	Award	Diploma in	Name of Student
The Sustainability Innovation Challenge	3rd Place	Chemical Engineering	Aiken Ang Wei Yang
		Chemical Engineering	Chua Wei Jun
		Pharmaceutical Science	Sandya Saad Janjua
		Pharmaceutical Science	Leong Lin Yu
		Pharmaceutical Science	Abdul Malik Fazeela Fathima
World Skills Singapore	Gold Medal Medallion for Excellence	Chemical Engineering Pharmaceutical Science	Teo Jun Yang Jonathan Tan Xian Xun

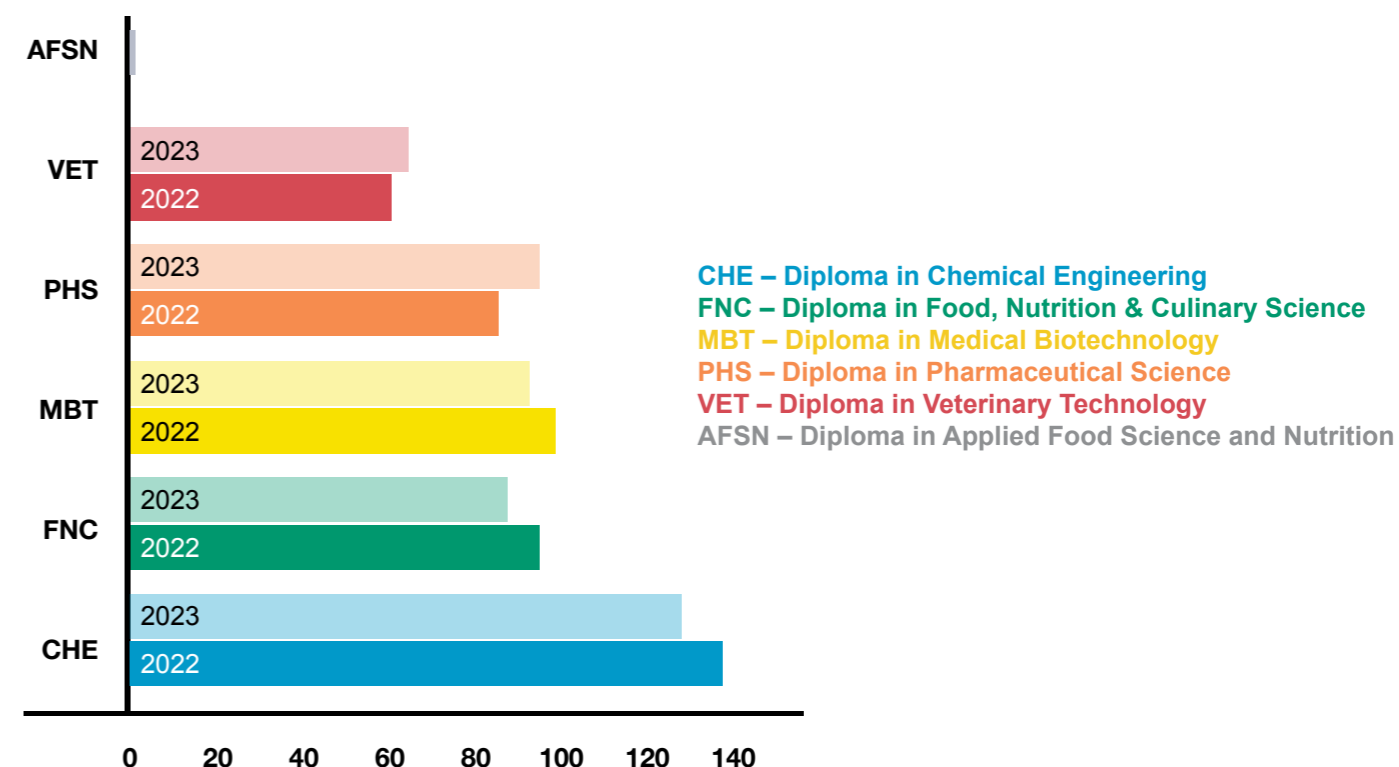
## AY23/24 Others

Academic Award	Diploma in	Name of Student
The President Award for Boys' Brigade	Medical Biotechnology	Patrick Soh Woon Kiat

# Number of Graduates

## Full-Time Courses

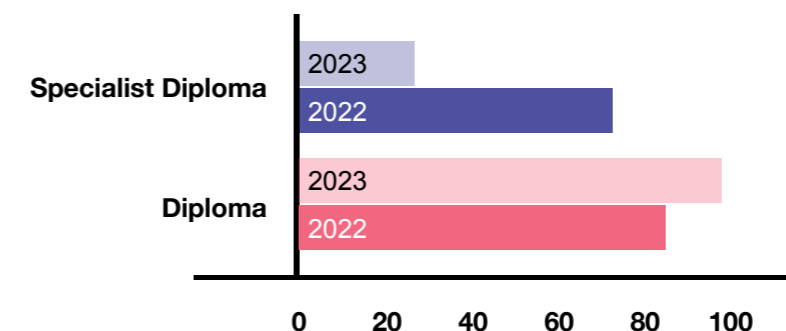
AY2023 - 466 graduates  
 AY2022 - 479 graduates



CHE – Diploma in Chemical Engineering  
 FNC – Diploma in Food, Nutrition & Culinary Science  
 MBT – Diploma in Medical Biotechnology  
 PHS – Diploma in Pharmaceutical Science  
 VET – Diploma in Veterinary Technology  
 AFSN – Diploma in Applied Food Science and Nutrition

## Part-Time Courses

AY2023 - 124 graduates  
 AY2022 - 157 graduates



### Part-time Courses

- Diploma in Applied Science (Aquaculture)
- Diploma in Applied Science (Chemical Technology)
- Diploma in Applied Science (Veterinary Technology)
- Specialist Diploma in Environment & Water Technology
- Specialist Diploma in Laboratory Management & Instrumentation
- Specialist Diploma in One Health
- Specialist Diploma in Veterinary Wellness Care

# Staff Awards

Awards	Staff
Public Sector Transformation (PST) Exemplary SkillsFuture Award (2023)	Dr Leong Meng Fatt
TP Exemplary SkillsFuture Award (2023)	
TP Exemplary Leader Award (2023)	Dr Kalpana Bhaskaran
TP Exemplary Overcomer Award (2022)	Glycemic Index Research Unit (GIRU) comprising of: Dr Kalpana Bhaskaran (Team Leader) Ong Jing Ting Saihah Mohamed Salleh Sharifah Fatanah Bte Syed Abdullah
Teaching Excellence Award (2024)	Mr Zacchaeus Siew
President's Award for Teachers (PAT) Finalist (2022)	Dr Maisha Foo
Teaching Excellence Award (2023)	A Seriously Fun IDL-ConSus X INNOVA
Educational Innovation Awards (2023)	Dr James Lim (ASC – Lead) Team Members: Terence Toh (I&ED), Leong Meng Fatt (SQD) and ASC Staff: Loh Han Liat, Alvin Tan, Oliver Chang, Huang Zhi, Loh Gin Hin, Clara Teo, Low Ji Zhen, Valerie Koh, Guo Ren, Quah Xin Jie
National Day Awards (2023)	Commendation Medal – Dr Jiang Li Long Service Medal – Dr Loh Gin Hin, Mr Paul Sin Fook Choy, Mr Loh Han Liat, Ms Peh Leh Heong
National Award (COVID-19) (2023)	Mr Louis Tay
National Day Awards (2022)	Public Administration Medal (Bronze) – Dr Loh Gin Hin Commendation Medal – Mr Paul Sin Long Service Medal – Dr Diana Chan

# Publications

## Peer-reviewed articles

E Santillan, F Yasumar, RS Vethathirri, SS Thi, HY Hoon, DPS Chan, S Wuertz (2024). Microbial community-based protein from soybean-processing wastewater as a sustainable alternative fish feed ingredient. *Scientific Reports (Accepted for publication)*

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IY Shua, RP Dewinta, PS Teo, DY Low, K Bhaskaran, WN Loh, LY Peng, J Chambers, T Mina (2024) The development and validation of a macronutrient and taste preference ranking task in multiethnic Asian population. *Food Quality and Preference* 116, 105135

S Sultana, A Azlan, MN Mohd Desa, NA Mahyudin, A Amaladoss (2024) A review of CRISPR-Cas and PCR-based methods for the detection of animal species in the food chain-current challenges and future prospects. *Food Additives & Contaminants: Part A* 41(3), 213–227

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SSK Yap, WJ Choy, RYH Tan, MHT Ling (2024) Assembly of Single Substance Use Epidemiological Models. *Acta Scientific Medical Sciences* 8(1): 43-50

K Chandra Rajan, Y Li, X Dang, Y-K Lim, M Suzuki, SW Lee, T Vengatesen (2023). Directional fabrication and dissolution of larval and juvenile oyster shells under ocean acidification. *Proceedings of the Royal Society B: Biological Sciences* 290: 20221216

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KJL Lee, SF Wong (2023) Comparative Environment and Socioeconomic Assessment on Mixed Plastic Waste Management: A Singapore Case Study. *Science of the Total Environment* 893, 164884

KJL Lee, SF Wong (2023) Multi-Objective Taguchi Optimization of Cement Concrete Incorporating Recycled Mixed Plastic Fine Aggregate Using Modified Fuller's Equation. *Buildings* 13(4), 893

KJL Lee, SF Wong (2023) Optimization of Fiber-Reinforced Concrete Composite with Recycled Aggregate and Fiber Produced with Mixed Plastic Waste. *Materials Today: Proceedings*

MHT Ling, S Mustakim, PN Lau (2023) Development of a Basic Chemistry Conversational Corpus. *Acta Scientific Nutritional Health* 7(2): 48-54

TS Kanok, MA Hossain, MR Islam, AKMA Shah, MA Rahman, MSA Sarker, UK Fatema (2023) Evaluation of Banana Stem Ash Extract as a Low-Cost Culture Medium on the Growth and Pigmentation of *Spirulina platensis*. *Egyptian Journal of Aquatic Biology & Fisheries* 27(5): 1489–1504



# Publications

## Peer-reviewed articles

BK Patel, KH Patel, SM Moochhala (2023) Gut microbiota intervention strategies using active components from medicinal herbs to evaluate clinical efficacy of type 2 diabetes – A review. *Clin Transl Disc* 3:e170

G Ragaseger, KL Chan, KY Tan, S Ramasamy, KM Cho, A Amaladoss, BK Patel (2023) Hydroponics: Current Trends in Sustainable Crop Production. *Bioinformation* 19(9): 925-938

S Ramasamy, KL Chan, KY Tan, G Ragaseger, KM Cho, BK Patel (2023) Effects of Different Light Spectrums on Kailan (*Brassica Oleracea* Var. *Alboglabra*) Growth in Hydroponics (NFT). *Novel Research in Science* 15(2): 1-8, NRS, 00858

BCY Toh, MHT Ling (2023) Applications Utilizing CRISPR/Cas9. *Novel Research in Sciences* 14(1): NRS.000826

V Vello, S-M Phang, S-W Poong, Y-K Lim, F-L Ng, J Shanmugam, M Gopal (2023). New report of *Halumphora subtropica* (Bacillariophyta) from the Strait of Malacca and its growth and biochemical characterisation under nutrient deprivation. *Regional Studies in Marine Science* 62: 102947

KM Wong, BJH Sim, MHT Ling (2023) Consistency Between *Saccharomyces cerevisiae* S288C Genome Scale Models (iND750 and iMM904). *Acta Scientific Microbiology* 6(3): 63-68

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CJK Wong, YK Tai, JLY Yap, CHH Fong, LSW Loo, M Kukumberg, J Fröhlich, S Zhang, JZ Li, JW Wang, AJ Rufaihah, A Franco-Obregón (2022) Brief exposure to directionally-specific pulsed electromagnetic fields stimulates extracellular vesicle release and is antagonized by streptomycin: A potential regenerative medicine and food industry paradigm. *Biomaterials* 287, 121658

## Conference papers

KM Cho, KY Tan, KL Chan, G Ragaseger, BK Patel (2024) Developing Innovative Soil-less Microgreens Cultivation. *8th Edition of Global Congress on Plant Biology and Biotechnology*, 25 – 27 Mar, Singapore (Poster)

E Santillan, H Xu, PL Loo, F Yasumaru, RS Vethathirri, H Rong, D Stuckey, Z Qian, Y Zhou, D Chan, S Wuertz (2024) From Promise to Practice: Microbial Synthesis for Sustainable Aquaculture and the Circular Bioeconomy. *ASM Microbe*.

C Paul, C Irene, R Guo, BS Woo (2024) Educational Bots: How Chatbots and intelligent agents can improve student. *18th annual International Technology, Education and Development Conference*, 4 – 6 Mar, Valencia (Spain)

XJ Quah (2024) *Veterinary Nursing Education, MAVNA Veterinary Nursing Symposium* 5 Mar, Selangor, Malaysia.

SY Ahmad, H Li (2023) In-Vitro Antiviral Efficacy of Liferoots® Oral Spray Against Human Coronavirus-229E. 5th Liyang Conference, 9 Nov, Indonesia (Best Poster Award)

A Amaladoss, M Meow, T Narayan, BK Patel, S Moochhala (2023) A Rapid, Sensitive and Label-Free Multiplex Meat Speciation Kit. *International Halal Science Conference*, Kuala Lumpur (Best Paper Award)

KG Lee, R Guo, C Paul, PN Lau (2023) A proof-of-concept study on the efficacy of agent-enabled nudge messages on learners' online learning behaviours. *eLearning Forum Asia 2023*

KJL Lee, SF Wong (2023). Recycled Mixed Plastic Fine Aggregate in Cement Concrete. *17th International Congress on Polymers in Concrete*, 17 – 20 Sep, Warsaw, Poland: Proceedings

# Publications

## Conference papers

KJL Lee, SF Wong, KYP Lee, NY Ho, AL Moe (2023) Environmental Assessment of Asphaltic Wearing Course Containing Mixed Plastic Waste in Singapore. *77th RILEM Annual Week & 1st Interdisciplinary Symposium on Smart & Sustainable Infrastructures*, 4 – 8 Sep 2023, Vancouver, BC, Canada: Proceedings

GH Loh, S Tan (2023) HyFlex Learning: Engaging Student. *HyFlex Collaborative Conference*, Academy for the Advancement of Teaching, Leadership and Schools (Albany)

JZ Low, Loisa, O Swan, BH Teo, TP Ngoc (2023) Veterinary workforce shortage- Recruitment, retention and expansion of work scope of veterinary nurses and technicians. *Singapore Vet Show* 13 – 14 Oct, Singapore.

F Mohd, X Ni, A Yeo, F Ilyas, T Yew, N Mohammad, H Miao (2023) Food Waste Valorisation Via Metabolic Engineering: A Sustainable Approach Towards Bio-Based Pigment Production. *Metabolic Engineering 15 Conference*, Singapore.

I Prakash, K Tan, WY Koh, A Amaladoss (2023) CRISPR-based Point-of-Care Test Kit for Hand, Foot and Mouth Disease (HFMD) *Hyper Interdisciplinary Conference*, Bangkok, Thailand.

XJ Quah, E Yong (2023) Challenges faced by Veterinary Nurses/ Technicians in Singapore. *Singapore Vet Show* 13 – 14 Oct, Singapore

G Teo, AJ Seah, LB Goh (2023) Pellet formulation with recycled fish guts and fruit waste as alternative commercial fish feed. *World Aquaculture Society Conference*, Darwin, Australia

SF Wong, KJL Lee, KYP Lee, NY Ho, AL Moe (2023) Asphalt Testing for Mixed Plastics Road Pavements. *International Conference on Advancing Sustainable Futures*, 5 – 6 Dec, Dubai, UAE: Proceedings

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JZ Low (2022) Mirror mirror on the wall: Ruminations on reflective practice. *AVTE Conference* 5-7 August, Philadelphia, USA.

## Book Chapters

SC Wuang (2024) Microalgae-based Recirculating Aquaculture System. In K Al-Kodmany, AK Ng et al (Eds.) *The Vertical Farm: Scientific Advances and Technological Developments*. (In Press)

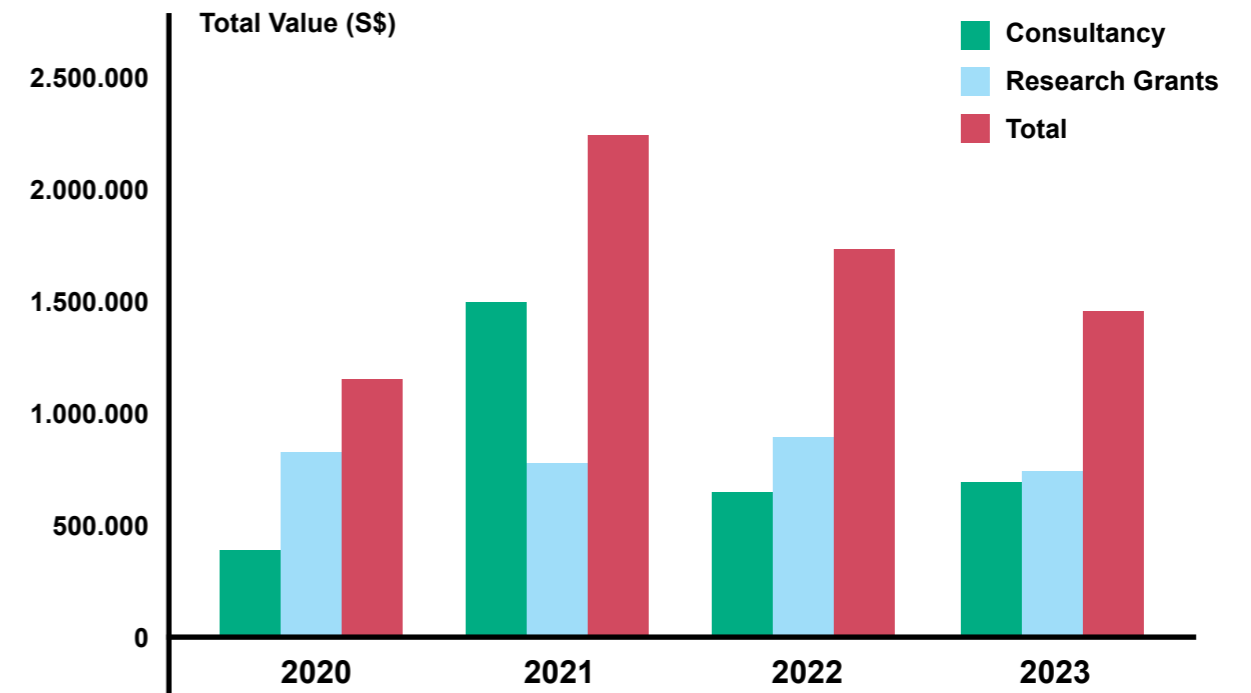
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# Inventions

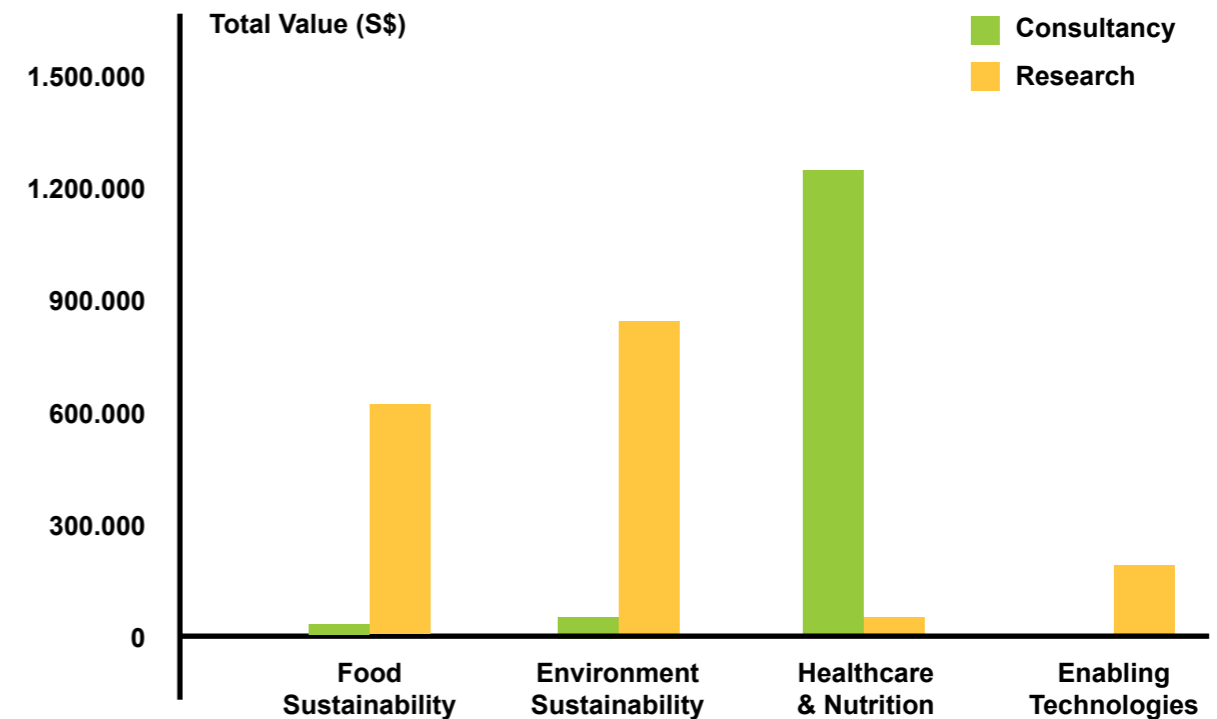
S/N	Title of Invention
1.	Fruit by-products to Functional Food Ingredients
2.	Sustainable Cleaning Products from Probiotic Fermentation of Fruit Waste
3.	In vitro Enzymatic Assessment of Glycemic Index (GI)
4.	A Biofilm-based Water Treatment Technology in Aquaculture
5.	Development of FOUR (4) Ready-to-Eat (RTE) Healthier Choice Symbol (HCS) Complaint Meals
6.	Vitamin E and ε-Poly-L-lysine Conjugate as Effective Antimicrobial Agent for Applications in Aquaculture
7.	Concrete with Recycled Mixed Plastic Aggregate
8.	Photon Induction of Pest Resistance in Leafy Vegetables by Upregulating MYB12 Expression and Enhancing Rutin Content
9.	Kale's Innovative Indoor Cultivation Practices
10.	Kai Lan's innovative Indoor Cultivation Practices
11.	Choy Sum's innovative Indoor Cultivation Practices
12.	Nai Bai's innovative Indoor Cultivation Practices
13.	Pak Choi's innovative Indoor Cultivation Practices
14.	Innovative Photoactivation and Cultivation Practices of Cherry Tomatoes and Capsicum for Urban Indoor Integrated Systems
15.	Development of an Anti-Splash Foam from Waste Cooking Oil for Sanitary Applications
16.	Efficacy of Dietary Manipulation on Gut Microbiome and its Metabolites (Probiotics)
17.	Efficacy of Dietary Manipulation on Gut Microbiome and its Metabolites (Feed Formulations)
18.	Cement Concrete Incorporating Recycled Plastic Aggregate for Production of Non-Structural Precast Elements
19.	Fermentation of Cordyceps and Determination of Cordycepin Using HPLC
20.	CRISPR-based Rapid Onsite Pathogen (CROP) Test Kit for Shrimp
21.	CRISPR-based POCT Kit for Hand, Foot and Mouth Disease
22.	A Novel Recycle Aquaculture System from Laboratory to Full Scale Application: Nitrogen Elimination By High-efficiency Spinning Bed Bioreactor and Anaerobic Ammonium Oxidation Chamber
23.	Formulation of Instant Beverages Containing Bioactive Peptides
24.	Collapsible Cell-encapsulating Scaffolds to Enhance Magnetically-induced Secretome Stabilisation and Potency

# Research Grants and Consultancy

## Overview of Revenue



## Revenue (FY2022 & FY2023) by Technology Clusters



## Acknowledgements

As we innovate alongside the industry, ASC would like to express our heartfelt gratitude for the unwavering support and trust of our industry collaborators. Your partnership has been a catalyst for our growth and progress.

Together, we create a better tomorrow!

## Editorial Team

Dr Wang Shy Chyi (Editor-in-Chief)  
Ms Jo-anne Loh Mun  
Dr Joel Yong Kah Jin  
Dr Lee Koon Guan