FEDERATION OF ASIAN & OCEANIA PEST MANAGERS ASSOCIATIONS

MAGAZINE

JANUARY 2021

FAOPMA-Pest Summit Virtual Conference 2020

SURVIVE COVID-19, PROTECT YOUR FUTURE

18-19th November 2020

Full Report Inside!

FAOPMA
FEDERATION OF ASIAN & OCEANIA PEST MANAGERS ASSOCIATIONS
亞大區蟲害管理協會聯盟

Protecting the Lives and Homes of Over Four Billion People

Contents

Front Cover: virtual conferences became the norm in 2020. The biggest meeting across the region was FAOPMA-Pest Summit 2020, see full report Pages 4-15.

Let's Forget 2020???

2020, what a *horrible* year. This has been a period that none of us will forget for the rest of our lives. The COVID-19 pandemic completely changed our existence with a year was marked by: movement control orders and lock downs; physical isolation from friends, family and colleagues; business closures and an economic recession; and most travel beyond the immediate vicinity was halted. But the greatest terror of all has been the fear of one's own mortality. By the end of 2020, there were a reported 84 million cases and, tragically, some 1.8 million deaths. Not surprisingly, this issue of the FAOPMA Magazine feature a number of CVOID-19 related articles.

You may well ask, who could have predicted the COVID-19 pandemic?

To consider this question, we only have to look at history. During my life time, there have been the emergence of numerous diseases, including; Lyme, Ebola, Nipah, SARS, Lyssavirus, Ehrlichia, HIV, Hepatitis C & E, Babesia, Hendra virus, H1N1, MERS, VRE, and MRSA, just to name a few. Plus we have seen the spread of known pathogens to new parts of the world, including; West Nile, Zika, and Chikungunya viruses. Furthermore, vector-borne disease such as dengue and tick-borne encephalitis are on the increase.

Perhaps the question should be; ***how could have we not seen this coming???*** We must look to the past in order to predict the future, and to prevent the worst of history repeating itself. ***Thus we can never forget 2020!!!***

Yet in spite of the pandemic and a lack of planning for the inevitable, there have been a number of heroes in the battle against this virus. Obviously front line medical staff have done a tremendous job to save lives. Yet there is another group of unsung heroes, whose efforts have largely gone unnoticed. A group that very rapidly responded to the situation, namely pest control operators. In spite of the huge risks to themselves, this industry has been at the forefront of batting the worst contagion seen for over 100 years. Yet COVID-19 infections in pest managers have been remarkably rare and this has been a great testament to themselves and their employers. You should all be very proud of your achievements in protecting the community and saving lives. We thank you all. ■

Stephen Doggett (Chief Editor)

President's Report

Vasili Tsoutouras
President FAOPMA, Inc. and AEPMA

***What interesting times*, has been a common refrain during this global pandemic.** Despite this, I could not be prouder of the achievements the members have all contributed to an industry that is needed more than ever in these challenging times. It is a great pleasure to represent the Federation of Asian & Oceania Pest Managers Associations as President.

Firstly, I extend my appreciation and congratulations to The United Pest Management Association of the Philippines, Inc. (TUPMAPI) and the organising committee for hosting the 1st virtual FAOPMA Conference (see report on following pages). Although different to previous years, this online event was incredible to experience and, meeting with like-minded people at the FAOPMA-Pest Summit, is always enlightening and a true reflection of dedication to the industry. As always, it is an honour and a delight to meet fellow FAOPMA members even though in 2020 it was online!

This year the FAOPMA Conference will again be hosted by TUPMAPI. This year's theme is "***Pest and Business: The New Realities***" and brings a distinguished list of speakers to present their expertise. The programme will provide members and attendees opportunities to learn from exhibitors and exchange ideas towards the evolution of the pest industry.

In 2020 the "new look" FAOPMA website was launched. This new website has made it easier for our members to update their details, pay their membership fees and exchange ideas. We have some other ideas to further enrich our website and we will be sharing these with you later in the year.

Once again thank you for your continued support. ■

Yours sincerely,
Vasili Tsoutouras

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FAOPMA-Pest Summit 2020

A review of the most successful virtual conference ever held by FAOPMA

Stephen L. Doggett

Never in our lifetime has humanity faced a greater challenge. By mid-November 2020, the COVID-19 pandemic had resulted in more than 55 million cases and, sadly, some 1.3 million deaths. By the by the end of the year the number of deaths had surpassed 1.8 million.

Unfortunately, the economic impacts of the pandemic have been devastating. It was estimated that a single case of COVID-19 costs an economy $USD46,000. The World Economic Forum has now forecasted that the global economic costs could be as high as $USD15.8 trillion! Already we have seen unemployment skyrocket to levels not seen since the Great Depression with poverty rapidly on the rise.

Many business sectors are facing difficult times ahead and numerous establishments have already

FAOPMA-Pest Summit would like to acknowledge the following companies for their kind support for the 2020 Virtual Conference:

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gone bankrupt under the financial pressures caused by the COVID-19 pandemic. The pest management industry has not been immune to these impacts and companies are going to find survival to the future very challenging.

Due to lockdown measures and human safety, and that most countries halted international travel, the annual FAOPMA-Pest Summit meeting had to be cancelled. This was planned to be held in September 2020 in Manila, Philippines.

The Federation of Asian and Oceania Pest Managers Associations ('FAOPMA'), has a strong commitment for supporting the industry during these difficult times. Thus it was decided that a Virtual Meeting would be held based around the COVID-19 pandemic and the challenges this contagion has caused the industry. *Arguably, this event was the most important conference ever held to date in the global history of pest management*.

The theme of the meeting was '**Survive COVID-19; Protecting Your Future**', with the aim of safeguarding the pest management industry through an uncertain world. The event was held over 18-19/November/2020.

Assembled were many of the greatest speakers in pest management today. This included owners of companies who not only survived the Global/ Asian Financial Crisis but came through bigger and stronger. Presentations included talks on the future of COVID-19, the economic impacts of the pandemic, the impacts of the pandemic on urban pests, remote management options during the pandemic, remote learning, remote monitoring, marketing in times of COVID-19, business survival, overcoming mental health aspects, customer retention, and much more.

A special session was held to examine the impacts of the pandemic upon the pest management industry across the Asian, Pacific, and Indian regions, with talks given by the Presidents (or their representative) of the various industry associations.

In order for the meeting to be inclusive, the Organizing Committee (OC) decided to offer the registration at a much reduced cost, only USD$50, and talks were translated into multiple languages including Chinese, Hindi, Indonesian, Japanese, Korean, and Thai. Most importantly, the meeting was designed to be all-encompassing

Opening FAOPMA-Pest Summit 2020 was Chairperson, Ms Josefina Dueñas.

and made open to anyone who wished to attend the meeting. The OC wanted to support the entire pest management industry, even those not yet under the FAOPMA umbrella. The committee have also made all talks available for a year after the event, as we know that everyone is very busy these days and it is difficult to sit through an entire day's worth of talks.

In total, there were some 1,146 delegates from 27 nations at the meeting. This was a phenomenal success in light of the meeting being the first virtual conference ever held by FAOPMA and the short lead-in time from announcement to the running of the event.

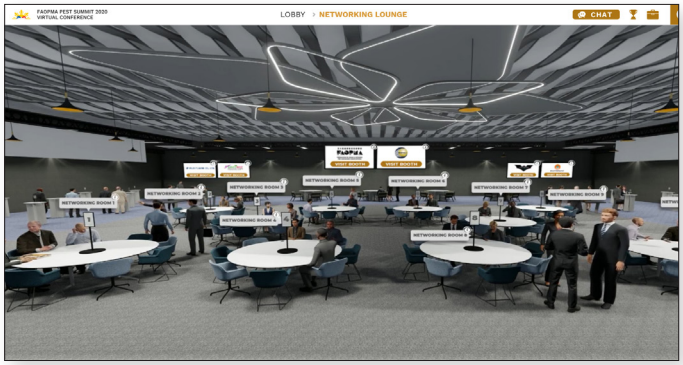
Exhibition booths were available to view the latest and greatest products from a variety of companies. All up there were some 17 exhibitors at the meeting. These booths were considered great value by the company. Each booth contained videos of various products and information sheets that could be downloaded for later review. It was also possible to speak directly with a company representative. Many booths were interactive and included games and a photo booth.

Beyond the talks and exhibitions, break out rooms were available to allow for discussion between small groups.

All registrants received an e-copy of the souvenir conference program. This program was some 155 pages in length and included welcome messages from all the Presidents of the FAOPMA member countries, details of the major sponsors, the history of FAOPMA, the FAOPMA Executive and Organizing Committee, plus abstracts and biographies of all the speakers. The Organizing Committee decided that this book was to be made free to everyone, including those that did

not attend, and thus can be downloaded from https://faopma.com/Conference/Summit-2020.

There were some 38 presentations, with the event professionally hosted by **Don Puno**, who is a professional TV voice over actor in the Philippines. **Josefina Dueñas** (Chair of the event) opened the meeting on Day 1 and reviewed how the COVID-19 pandemic rapidly changed the world we live in. This was followed by the President of FAOPMA, **Vasili Tsoutouris**, whom provided the welcoming remarks. Vasili highlighted how the conference aimed to give all those in the pest management industry a helping hand during the difficult times created by the pandemic, and he discussed some of the challenges that lay ahead.



The Networking Lounge.

During this disease outbreak it is important to be table to recognise the clinical signs of COVID-19, how it is transmitted, how to prevent being infected, and most importantly, when the pandemic will be defeated. Thus the first full presentation of the meeting was on the future of COVID-19 from a clinical perspective, presented by **Prof. Dominic Dwyer** from Australia. The main points included that transmission is mainly by inhaled droplets or via contamination of surfaces. The main hope for controlling the pandemic in the long-term is via vaccination. However, there are still many questions unresolved, such as how long the vaccine will last. Only time will answer this question and in the meantime, people should continue to practice physical distancing, good hand hygiene, and wear face masks to protect themselves and others. You can read a more comprehensive overview of Dominic's presentation elsewhere in this Magazine (see Pages 24-25).

Pascal Cai, Director of International Affairs with the Chinese Pest Control Association is

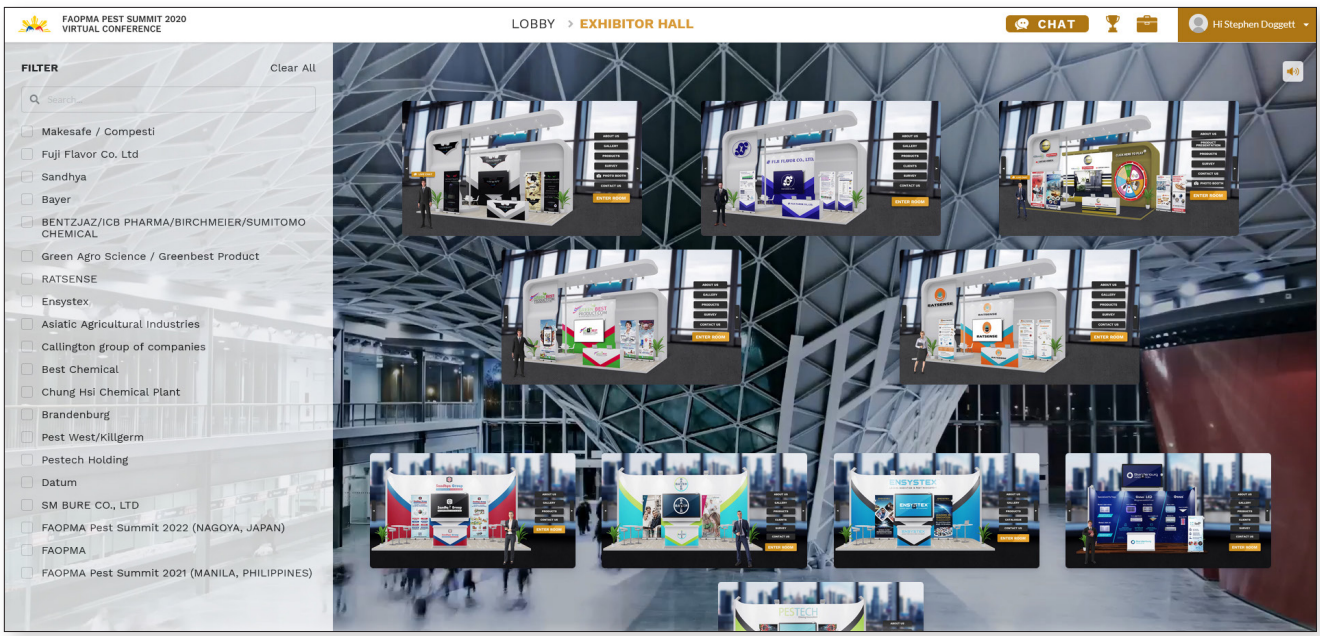
also a Vice President at Wells Fargo Bank in the US. Pascal provided an overview of the economic consequences of COVID-19. He stated that 20% of small business closed in the US and most countries went into recession, the worst recession since 1870. Pascal estimated that business confidence should return to pre-pandemic levels by the end of 2021, but there is still a lot of economic uncertainty.

A presentation was then given by a Philippine local; **Mikael David**, Marketing Director of Globe. He focused on the opportunities created by the pandemic from an online competitive standpoint. Mikael stated that online demand has increased by 30% during the pandemic and this has created new opportunities. Thus it is now important to understand consumer behaviour in order for your business to be discovered. For example, in Australia, TV ads are the number 1 means of brand discovery, however in Thailand it is via social media.

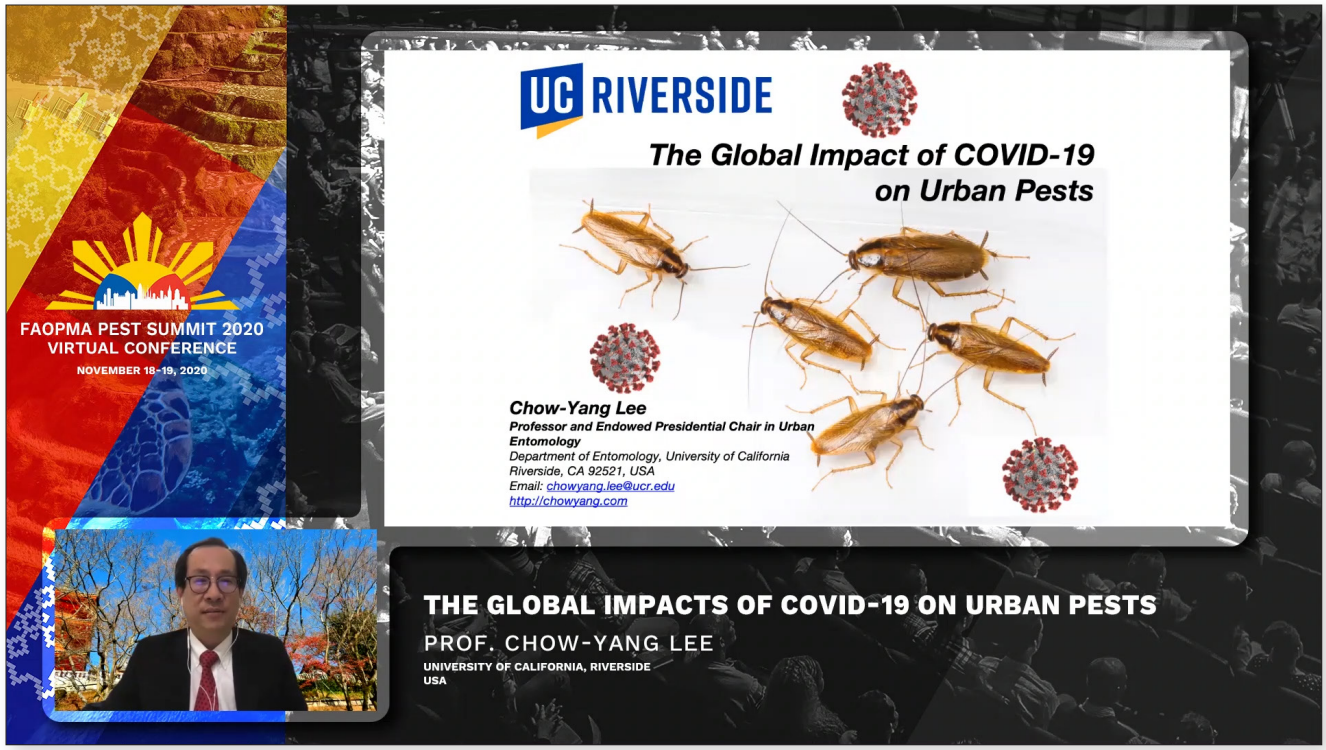
The keynote presentation was given by **Prof. Chow-Yang Lee** of the University of California, USA, who reviewed the global impacts of COVID-19 on urban pests. Part of his discussion was based around the paper that we wrote that appeared in the April 2020 issue of the *FAOPMA Magazine* (see: https://faopma.com/Resources/FMFiles/Magazines/202004/FAOPMA_Magazine_2020_April_Page4-7_COVID-19_Urban_Pests.pdf). Chow-Yang mentioned how certain pests such as rodents have become more prominent, and how the COVID-19 pandemic influenced epidemics of dengue virus. He considered that an important part of the future of the industry is tele-pest control, whereby people ring up (and pay) for advice. Other future technology will be based around artificial intelligence and remote monitoring, and Chow-Yang expects that booking apps for pest management services will be developed along the lines of Uber and Grab. He also expressed the need for Pest Management Associations to work together in order to develop stronger alliances, and that online training needs to be developed for the region in multiple languages.

I gave the next presentation and reviewed the parallels between COVID-19 management and pest control, using bed bug management as a model. This talk was based on an article I wrote for the July issue of the *FAOPMA Magazine* (see: https://faopma.com/Resources/FMFiles/Magazines/202007/FAOPMA_Magazine_2020_July_Page22-26_Lessons_from_COVID-19.pdf).

Dr David Lilly (Ecolab, Australia) spoke on the challenges that COVID-19 have caused to daily



The Exhibition Hall of FAOPMA-Pest Summit 2020 Virtual Conference.



Prof. Chow-Yang Lee from the University of California provided the keynote presentation.

business. He reviewed the challenges (cancelled jobs, delayed payments, curfews, travel, PPE availability) as well as the opportunities (increase in disinfection services). Expect an article on this talk in an upcoming issue of the *FAOPMA Magazine*.

Vasili Tsoutouras, President FAOPMA, Australia, discussed remote management operations during the pandemic. He reviewed many of the networking platforms available, along with their advantages and disadvantages. One important aspect that Vasili focused on was how to manage and lead a team in a world where we are working remotely; this is an enormous challenge at present.

A presentation of remote learning during COVID-19 was given by **Edwin Lim** of Syngenta, Singapore. He highlighted how important remote learning is as around 50% of his company is presently working from home.

A challenge during the COVID-19 pandemic has been to have your company noticed when the media is dominated by discussions on the disease. Thus **Viren Merchant**, Director, PCAMB, India, provided a presentation on marketing in the time of COVID-19. With a decline in non-discretionary spending, it has become harder to sell many products. Viren noted that most of his business comes from referrals and existing customers, and thus most of your marketing budget should be directed to your loyal customer base. Marketing during the pandemic is about focusing on the existing customer and brand building, and that it is important to resonate with the customer.

Without a question, one of the most important talks of the meeting was given by **Dr Lourdes Fabia**, Founder of Evolvelink Consultancy Services, Philippines. The COVID-19 pandemic has created unprecedented pressure on our mental health, and Lourdes presented on being mentally healthy now and beyond the pandemic. She noted that it is important to train the mind to be calm, and to take time to pause and unplug from the world to make the mind more restful. Physical health is critical for mental health, and thus exercise, eating healthy, adequate sleep are all necessary for a restful mind. Most importantly, we need to cultivate meaningful relationships as loneliness is more dangerous to our health than smoking. Also see the extended article on Lourdes' presentation in this issue (see Pages 26-

27).

One of the most fascinating presentations was by **Fu Youcai**, Chairman, Wuhan Lifetai Technology, China. Fu Youcai is from Wuhan, the site were the virus that caused COVID-19 was first discovered. His company was tasked with the mammoth job of disinfection. Fu reviewed the progress of the disease, how it impacted the region, and in what way the pest management industry was called upon to defend the health of the community. Again, a more detailed manuscript of his presentation appears in the current issue of the FAOPMA Magazine (see Pages 28-35).

Day 1 of the meeting was concluded with sponsor talks from **Gary McMahon** of Makesafe Australia, **Chaiamon Chantarapitak** of Green Agro Science (Thailand) and **Dr How Yee Fatt** of Bentz Jaz (Singapore)

The following day was kicked off with one of the industry stalwarts; **SuChart Lee**, President-Elect, FAOPMA, Thailand. SuChart featured as the ICON in the April 2020 issue of the FAOPMA Magazine (see: https://faopma.com/Resources/FMFiles/Magazines/202004/FAOPMA_Magazine_2020_April_Page38-43_SuChart_Lee.pdf). SuChart owns the largest privately owned pest management company in Thailand, King Service Centre, and discussed how his company was able to survive and even prosper in the financial crisis created by the COVID-19 pandemic. His company made the conscious decision to have no layoffs and no pay cuts, and to achieve this amazing feat, they had to examine the cash flow situation and dip into fiscal reserves. Working time and expenditure was reduced, hygiene services added, and they prepared for the post pandemic world by adding new processes.

The presentation that was voted the best of the meeting by the attendees was provided by **Taro Kanazawa**, Vice President of FAOPMA, Japan.

Taro's title was '*Competitive strategies for small pest control operators, now and amid COVID-19*'. Taro noted that the pest control marketing is still growing in spite of the pandemic. Moreover, larger companies are not growing faster than the smaller companies even though news of mergers and acquisitions by the multinational corporations dominate headlines in pest control circles. For smaller companies to be successful they must deliver on quality, be flexible, focus on niche markets such as certain cultural groups, and become known in the local community. Taro made the comment that a small company is unlikely to have specialised knowledge and thus it is best to share your information as your experience grows. He believes that hiding information is detrimental in the long-term as you create competitors and your knowledge will not develop.

The next speaker in the program was this month's ICON, **Regine Lim**, General Manager, Entopest Environmental Services, Malaysia (see Pages 16-23). Regine spoke on professionalism in a COVID-19 world; protecting employees and customer retention. She noted how it was difficult for pest managers to reach the client during lockdown, but fortunately most countries deemed pest control as an essential service. However, many staff faced issues during the lockdown and could not travel to work. Employee protection became the number one issue, in order to protect themselves and the customer. Regine believes that pandemic has led to an enhancement in the level of professionalism within the industry.

The following three talks focused on monitoring during COVID-19. This included the monitoring of stored product pests by **Rikiya Sasaki**, Senior Manager R&D, Fuji Flavor, Japan; remote

monitoring of rodents by **Deanne Baptista**, Director, Cre8tec Pte Ltd, Singapore; and remote monitoring of flies by former FAOPMA President, **Junichiro Katayama**, who is also President of Semco Co. in Japan. All discussed how early detection of the pest can be achieved through effective monitoring, and that remote monitoring has huge financial benefits in reducing workload costs.

With the COVID-19 pandemic, many pest control companies added sanitation and disinfection to their service. Thus presentations on this topic were important and the following two presentations examined the use of disinfectants. **Ujjwal Kumar**, Business Head of fumigants, UPL, India reviewed the key considerations in the selection of disinfectants, while **Raju Parulkar**, Honorary Treasurer, FAOPMA (India) examined disinfection protocols.

Following the disinfection talks were 14 five minute presentations from the Presidents (or their representative) of the Associations that make up the FAOPMA family. Each speaker spoke on how the COVID-19 pandemic affected the pest management industry in their own country. For the most part, the impacts were remarkably similar across the region. Many pest control companies lost short-term contracts and found it difficult to service clients, while payments were often delayed. Restaurants, bars, and tourism were especially hard hit, which in turn resulted in less work for pest control companies. Fortunately many took up disinfection services, which allayed some of the financial losses in other areas. Several papers from these talks appear in this issue (see Pages 64-70). Note that all of the presentations by the Presidents are available to view free from: https://faopma.com/Conference/Summit-2020. The welcome speech by the FAOPMA President, **Vasili Tsoutouras** can also be watched for free.

The final presentation on the program was by **Dr Raymond Lee**, Honorary Secretary FAOPMA, Malaysia. Prior to the virtual conference, Raymond conducted a survey with the aim of determining the impact of the COVID-19 pandemic upon the pest management industry. The results of this survey appear in this issue of the FAOPMA Magazine (see Pages 36-43).

FAOPMA President, Mr Vasili Tsoutouras provided the welcoming remarks.

The event was wrapped up with closing speeches by **Josefina Dueñas** and **Vasili Tsoutouras**. Poignant comments from President Vasili's speech included; "This is a historical first for FAOPMA-Pest Summit, the virtual conference demonstrates the ability of the pest management industry to respond to COVID-19". "The world today is one small village and the pandemic of COVID-19 has demonstrated that no one country can operate in isolation..." "The future will be about communication, cooperation, and shared knowledge". How true Vasili!

Overall the Virtual Conference was extremely well received by the participants. Over 90% stated they were more than satisfied with the speakers, while almost 90% felt the program was excellent and the meeting well organized. These figures are testament to the quality of the speakers! Furthermore, over 85% felt the conference was directly relevant to their job. *Thus if you missed the meeting there is still an opportunity to register and watch all the talks* – you have until mid-November 2021 to do this! Registration is only USD$50 and the talks can be viewed from https://faopma.com/Conference/Summit-2020. All presentations are available in English, Bahasa, Chinese, Hindi, Japanese, Korean, and Thai.

Finally, I would like acknowledge the fact that I was privileged to work with an exciting and dynamic team on the Organizing Committee. This included the Chairperson **Josefina Dueñas** (Philippines) whose boundless energy and tireless drive made this event a possibility. Jojo was in turn supported by the Deputy Chairperson,

Hector Binwick (1st Reserve Member of FAOPMA, Philippines). Also on the Organizing Committee was **Taro Kanazawa** (FAOPMA Vice-President, Japan), **Dr Raymond Lee** (FAOPMA Honorary Secretary, Malaysia), **Regine Lim** (MPMA VP/ Membership, Malaysia), **Raju Parulkar** (FAOPMA Honorary Treasurer, India), and **SuChart Lee** (FAOPMA President-Elect, India). My role was as the Program Chair and taking the Minutes of the weekly meetings (someone had to organize the organizers!). Thank you to all my colleagues for making a truly world class and memorable event, and being just a terrific bunch of folk – I miss our weekly catchup.

The next FAOPMA-Pest Summit will also be held in Manilla, Philippines over 6-8/Oct/2021. It is envisaged that this will be a hybrid of a virtual and face-to-face meeting. Expect to see details in the April 2021 issue of the FAOPMA Magazine.

Most importantly we wish to thank the companies that supported the event, firstly the Platinum Sponsors; **Bentz Jaz**, **Fuji Flavor**, **Green Agro Science**, **Make Safe Australia**, and **Ratsense**. Plus the Gold Sponsors; **Bayer**, **Brandenburg**, **Ensystex**, **Pest Tech**, and **Sandya Group**, plus all the exhibitors. Offering to sponsor a virtual event during such economically difficult times demonstrates that these companies have *supreme confidence* in their products, and I hope you in turn support these high quality businesses. ■

Stephen Doggett is the Director of Medical Entomology, Westmead Hospital, Sydney Australia, and the Chief Editor of the FAOPMA Magazine.
Email: Stephen.Doggett@health.nsw.gov.au

Notable quotes from FAOPMA-Pest Summit 2020 Virtual Conference

"This conference is about identifying the challenges…about confronting the new paradigm of a COVID-19 world",
Vasili Tsoutouras, FAOPMA President.

"No one saw it [the pandemic] coming, no one wants it to come, and it is no one's fault that it came",
Prof Chow-Yang Lee, Professor, University of California.

"The next pandemic is considered to be mental health",
Dr Lourdes Fabia, Founder, Evolvelink Consultancy Services.

"With every opportunity is a great responsibility",
Josefina Dueñas, Chairperson, FAOPMA-Pest Summit 2020.

"No one can deny that COVID-19 has brought about enormous change",
Vasili Tsoutouras, FAOPMA President.

"Go with it (global change) or go against it",
Pascal Cai, Vice President, Wells Fargo Bank.

"AI [artificial intelligence] is changing our life",
Junichiro Katayama, FAOPMA Past President.

"Fighting COVID-19 requires a team effort on an unprecedented scale",
Raju Parulkar, FOAPMA Honorary Treasurer.

"Change is inevitable in this critical time",
Regine Lim, General Manager, Entopest Environmental Services.

"Preparation, prompt action, enhanced surveillance, cooperation, and science based solutions, are the key to COVID-19 control AND bed bug management",
Stephen L. Doggett, FAOPMA Magazine, Chief Editor.

"According to the World Bank, the pandemic represents the largest economic shock the world has ever seen",
Pascal Cai, Vice President, Wells Fargo Bank.

"The economic outlook remains exceptionally uncertain",
Pascal Cai, Vice President, Wells Fargo Bank.

"AI based monitoring will change the game of our industry",
Junichiro Katayama, FAOPMA Past President.

"Although climate change poses a greater danger to the long-term health of the planet, the onset of COVID-19 is too sudden and its impact too drastic",
Prof Chow-Yang Lee, Professor, University of California.

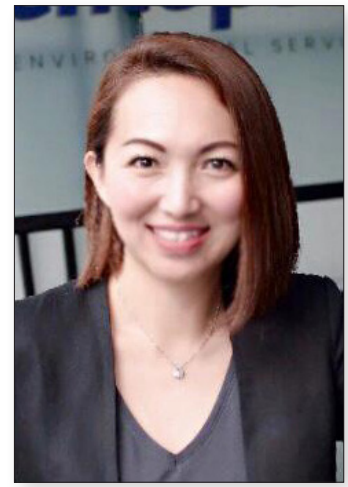
"73% of pest management companies have been impacted by the pandemic",
Dr Raymond Lee, FAOPMA Honorary Secretary.

"Small to medium sized pest control companies need to build long term relationships",
Taro Kanazawa, FAOPMA Vice President.

"PCOs became a vital force in the fight against the pandemic",
Mr Fu Youcai, Chairman, Wuhan Lifetai Technology.

"With any crisis, there is an opportunity",
Prof Chow-Yang Lee, Professor, University of California.

"During the pandemic, focus marketing on the existing customer",
Viren Merchant, Director, PCAMB. ■



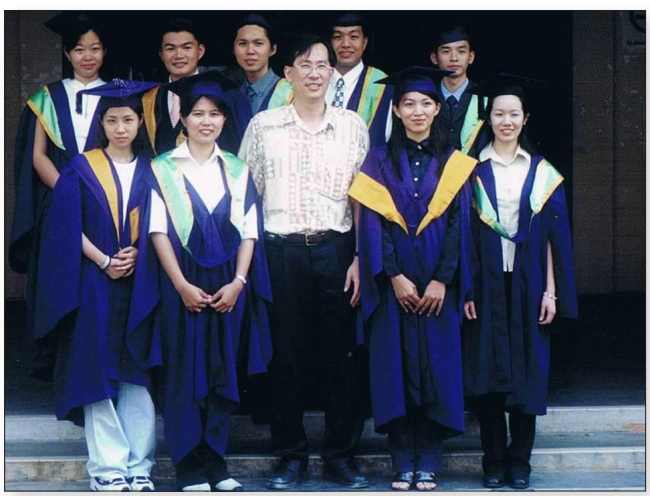
Regine Lim

An interview with an Icon

Interview by Stephen L. Doggett

Over the last two years, I have had the great honour of interviewing some of the most notable figures in the world of pest management. The vast majority have been individuals well advanced in their career, some semi-retired, but most still actively contributing to the industry.

For this issue I have decided on a slightly different track, to interview a rising star; someone destined to be a future industry leader. Already she has the mammoth task of managing a 130-person strong pest management company, while still caring for a young family – a challenge that few men can ever truly appreciate! She also has a direct link to the ICON featured in last issue having completed a Bachelor's degree under Prof. Chow-Yang Lee. More recently, she played a pivotal role on the Organizing Committee for the first FAOPMA Virtual Conference, which was arguably the most significant pest management event ever held. I am proud to present my colleague from the Organizing Committee, Ms Regine Lim.



Regine (front row, second from right) newly graduated from University Sains Malaysia, standing next to Prof. Chow Yang Lee, 2001.

Thank you, Regine, for agreeing to be this month's ICON. Firstly, please tell the readers about your history in pest control?

I graduated from University Sains Malaysia (Penang) as a certified entomologist in year 2001. Starting my career as an operation executive at Ridpest in Kuala Lumpur, I subsequently joined Ecolab as their Technical Manager in 2004. I rapidly progressed and learned fast to become their Southeast Asia Regional Manager where I managed the Pest Elimination Divisions in Malaysia, Thailand, Singapore, and Indonesia. In 2010, I started my own pest management company, Ecogreen Pest Management Sdn Bhd back in Penang. In running and managing my own pest control business and operations, I have gained vast experience in managing diverse pest management projects across a wide array of industries in the country. Ecogreen was acquired in 2018 by Entopest Environmental Services and I was appointed as the General Manager to continue leading and managing the business.

Why did you wish to start your own pest management company?

I worked in a local Pest Control Organization (PCO) and a Fortune 500 company for around 10 years over 2001-2010. I had a vision to develop a pest management company that comprises strength and culture from two different companies into one to deliver local customers' needs in different segments with an international standard.

So why did you decide to sell the company to Entopest? Was it then hard to work for someone else?

I think most entrepreneurs are looking for self-development and business advancement. After running my own business for around seven years in Penang, I found there's limitation for my company to grow further with my own strength and limited resources. Besides, my team deserved a better opportunity in gaining more work experience and if possible, I can provide them with significant benefit in their life as well as their career path when they work with me.

No doubt working for someone else is hard but it is the same to running an own business. To me the most important thing is to find a good boss or business partner who continuously drives you towards success and shares significant strategies towards common goals. My boss, Lee Cheun Wei is a true leader and a visionary. Entopest has grown aggressively in the last three years and now has a strong presence in Malaysia and Southeast Asia. This company of 130 employees continues to expand and we all as a team are passionate in moving towards its vision of serving the broader international market in Asia and other regions.

As noted above, you completed your Bachelor's degree under Prof. Lee. How important was it to have a mentor like Chow-Yang and to what extent did he introduce you to the pest management industry?

Chow Yang Lee is like family to me. We lived in a same island, Penang, and we shared common hobbies as Penangites; eating delicious street food and appreciating the best durian on earth

A picture of a modern business woman; Regine Lim, Managing Director of Entopest Environmental Services, Malaysia, 2018.

direct from the orchard. Ivy (Chow-Yang's wife) is a good cook; she bakes the best fruit cakes for me every year for Christmas. Chow Yang is very close to the pest control industry in Malaysia. In fact, I obtained my first job offer through his introduction to the industry even before my final year exam. He is my mentor since day one, showing me a life example as a professional pest manager, and selflessly contributing his knowledge to the industry. He developed and trained good students and gave constructive suggestions to his students especially when we wanted to join the industry or making any important life decision. I'm grateful to have him as my guidance in the journey of bugging the bugs' career life!

A young Regine studying hard at the University of Sains Malaysia, 2000.

In an industry so dominated by men, how hard was it for you to be accepted by the industry?

For me is not that hard, maybe I carry some male-characteristics in ME, hahaha. I think self-confidence is essential for us to start working in a male-dominated industry; we should know our capabilities and strength to deliver the job. I always focus on what tasks to be completed not who can do or who can't do the job. When we are open with a positive mindset and willing to work with the team, I'm sure we will have a good working experience with male colleagues and staff. Good communication and a willingness to share good ideas allows us to mix well with co-workers and they will accept us as part of their team more easily. We need to show our commitment in delivering results as well. End result determines your status in the team, not the gender. Actually, I'm blessed that gender is no longer a major issue in our industry now, we now have females winning service technician of the year and many capable women also holding important roles in pest control companies worldwide.

Do some of the older men find it hard to have a lady boss? How do you deal with such people?

When I just joined Entopest three years ago, we were still small with only 25 staff. Most of them had been with the company at least 5 to 10 years. I called a very first meeting to share my passion in this industry and my vision as a new leader to them. I made connection with them by acknowledging their past contributions and to specify the common goals we need to achieve together in the coming future as a team. For the past three years, I earned their respect by consistently doing what I said I would do, executing on lots of little achievements in our daily work, and being open about where my strengths and weaknesses were in my leadership. We always celebrate small and big achievement, so everyone feels their efforts are appreciated.

How can you encourage more women into the field of pest management? Does FAOPMA have a role in this and how can they help?

The Global Pest Control Services Market 2020-2024 reported our industry will grow with accelerating momentum over the next four

Regine lecturing during COVID-19 at Entopest.

years. With so much growth and opportunity, we need more professional and passionate PCOs in the growing market and women workforce is the answer. First of all, we need to encourage employers to look into hiring women to fill up the positions created along the growth. We work closely with universities and colleges to recruit women talent after their graduation. I was the chairman of WomenBizSENSE who encourages women entrepreneurship in northern Malaysia. I always share the challenges and satisfactions working in the Pest Control Industry. Most women find it interesting working in our industry and they are often inspired to explore more into our field for job opportunities. I think talking and sharing details about our job experience is one of the effective ways to encourage more women to join us to become part of the industry. I think FAOPMA has been acting as a very important platform showcasing many talented women leaders in our field through conferences speakers and also publications by women researchers over these years.

All of us in pest management have to work hand in hand to bloom this industry since we have plenty of potential even during the COVID-19 pandemic.

You have faced an added challenge of your career of working some distance away from your home. Correct me if I wrong, but every week you drive several hundred kilometres to your work place and then back home again at the end of the week. Obviously, this took you away from your family. So how did you deal with being a young mum away from your kids? I bet there were extra hugs when you return home!

I have a very supportive family who back me

on what I'm doing now. I'm with my team on weekdays in KL and I'm traveling back Penang every weekend to be with my family for the last three years. So far, I never missed any important family events and my kids are very independent. I told them about my vision and goal to achieve in my career and what I want to do for the industry. And they are part of my journey to fulfill these dreams. Since I'm going back to Penang every week so there's not much of difference at home for my absence as everyone are busy with work and school during weekdays, in fact we spend quite a bit of quality times during weekend. I want to thank my husband Elvin and my parents in law who really take good care of the kids while I'm away. In work, I'm grateful that my boss gives me full freedom on my leadership to manage the four branches in Peninsular Malaysia, so I can plan my time for both family and work effectively yet not affecting the end result that we wanted to accomplish.

What has been the biggest challenges the industry has faced during your time?

I think the biggest challenge the industry in Malaysia has faced is the lack of innovation and new technology to manage critical pest issues. But with the new generation of entrepreneurship coming up recently, we found more exciting products in the market. Besides, the new generation of PCOs are now very open and with initiatives to offer new methods and devices to manage pest issues on site. I would say there are more resources now we can reach out to be more professional and innovative in proposing an effective pest management program. I'm in the best era where I can still learn from the experienced industry gurus who have managed PCO businesses for decades, while I can also grow

and develop together with the next generation of PCOs to come to the future.

Please tell the readers how the COVID-19 pandemic has changed your business and its practices.

COVID-19 changed the way how we communicate in pest management services. Internally we learned to remotely manage the operational teams to deliver services efficiently during the movement control order. We also explored mass sanitizing and disinfecting projects in private and government sectors against coronavirus, and was aggressively involved in community services to flatten the curve. This is also the time we work hand in hand with our customers during the critical time. Despite the limited resources we had during the pandemic, we have to fight pest infestations in the surrounding environment, especially dengue cases, which represented another threat to the residence in Southeast Asia. I think COVID-19 made us realise that we have to go back to the fundamental requirements of a PCO in delivering the core objective of our business; being an exterminator to improve the public health of the community.

What are the challenges the pest control industry will face in the future?

I foresee the limited selection of professional pesticides for public health in the market and the implementation of more stringent regulation makes pest management more difficult in future. Besides, the availability of DIY pest control products is the biggest competition and allow end users to consider pest control services as least priority when come to household pest management. However, I think PCOs need to focus

Regine and colleagues enjoying the 2019 FAOPMA-Pest Summit in Korea.

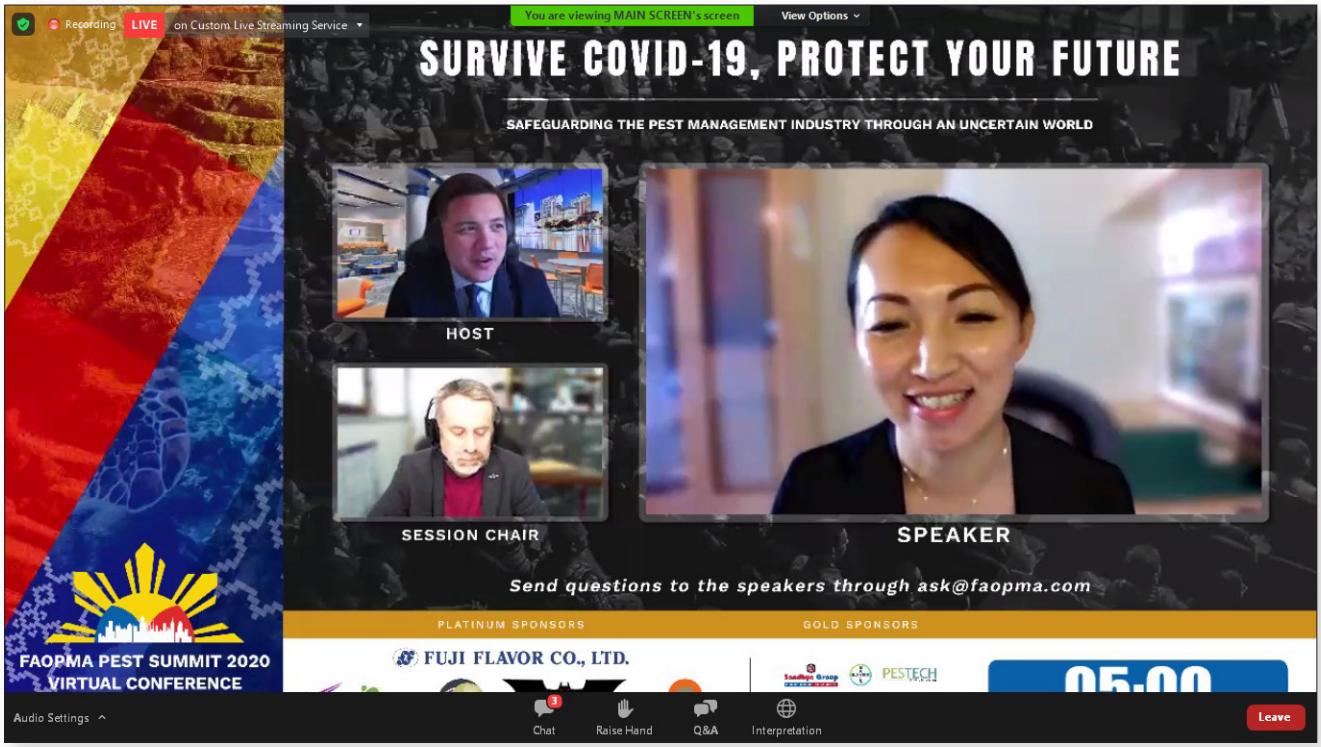
on grooming quality service technicians to fight this market trend. Professional control services will still grow significantly with the high demand from Pharmaceutical and Food Processing industrial in near future.

What do you think that Malaysia can teach the rest of the world about pest control?

Malaysia is still considered a developing nation and we have much to learn from the more advanced countries. Pest management in our region is a growing industry. We are slowly emerging to adopt the innovations and technologies that has spurred the growth in US and Europe. As a home-grown PCO, we may not have the capabilities for the research and development, and have limited expertise to develop pest innovations, but we can adopt and adapt these innovations and technologies to suit our local operations to spur the growth.

What I consider a strong point of our local PCO is our local corporate culture in our pest management business that has been in existence for the past 40 years. The current licensed 1900 local PCOs that has proliferated the industry as compared to only about five International PCO in this country is a testimony to this fact.

And I believe that in a large measure what makes a Malaysian PCO organization successful is its distinctiveness. PCO that have strong and unique cultures generally experience excellent performance which implies why many of the most successful PCO organizations today are thriving and growing because, in large part, of their unique and strong styles and values towards local corporate culture. Certain kinds of organizational cultures promote learning and information-sharing. In these environments of openness and



Regine Lim speaking at FAOPMA-Pest Summit 2020 Virtual Conference. Regine's topic was "Professionalism in a COVID world; protecting employees and customer retention"

trust, much less investment in formal training is necessary. They get work done when they say they will. They answer the phone when a client calls. They offer solutions when problems come up. Such a culture of dedicated staff whose goal is to ensure their clients is always satisfied with the services provided. We believe in constant dialogue and communication with our employees to ascertain and gauge their happiness quotient as well as obtain valuable feedback on what they expect from the organization. This approach makes employees feel valued.

Our local corporate culture is unique and it goes a long way in establishing greater cohesion in the PCO and an atmosphere of cooperation among our staff and customers. And I think this is the beauty of Malaysian PCOs I love to share with you all here.

What role does FAOPMA have in ensuring that there is technical excellence in the industry to the future?

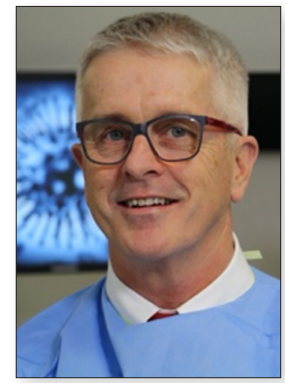
Continue support on technical information and communication across all regions are an important task undertaken by FAOPMA to ensure the industry remains professional and deliver service excellence technically and scientifically into the future.

What is your most proud achievement to date?

When I attended my very first international pest conference of FAOPMA back in year 2007 in Taipei, that event inspired me to become a speaker one day to this esteem community. Thus, speaking in FAOPMA Pest-Summit Virtual Conference 2020 as a speaker is my most proud achievement. Even though it was just a Virtual Conference, I feel honoured to be part of it and getting good feedback from the delegates. I achieved my dream here that I once visioned. Besides, I found my 3M; humble Mentors, caring Mates, and potential Mentees in this beloved industry which I worked for the last 20 years with and I will continue to stay passionate and to love it. ■

Thank you Regine for your insights and truly wonderful interview.

FEATURE



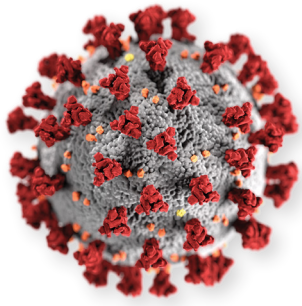
The Future of COVID-19 from a Clinical Perspective

What 1s the current state of COVID-19 infections and when will the pandemic end?

Dominic E. Dwyer

By 10 December 2020 there have been over 68 million cases of COVID-19 worldwide, resulting in over 1.5 million deaths

[SLD: as of 28/Jan/2021 the number is over 100 million cases and 2.1 million deaths]. As these are laboratory-confirmed cases, the true numbers are likely to be much higher as not everybody seeks medical care and testing access in many countries is limited. In Australia, there have been almost 28,000 cases and 908 deaths, with the bulk of these occurring in the second wave in Victoria in mid 2020. Australia and New Zealand are lucky in their remoteness, so that the banning of inbound travel allowed the opportunity to successfully implement physical distancing and improved infection control practices. Given there are as yet no effective antiviral drugs and licenced vaccines, these responses are remarkably similar to those undertaken during the 1918-19 influenza pandemic.



After the initial outbreak in China (starting in Wuhan, Hubei province) in early 2020, the greatest burden in cases has occurred in North and South America, and Europe. In many countries there has been more than one wave of COVID-19 activity. The extent of outbreaks in Asia varies from country to country, but most countries have had less impact from COVID-19 than in the Americas and Europe. However, infection rates in India, Bangladesh, Pakistan, and Indonesia remain high, and these outbreaks are continuing. Activity in the Pacific has been relatively modest.

In general terms, the mortality rate has decreased in successive waves. However, this is not likely due to a reduction in virulence of SARS-CoV-2 [SLD: this is the virus that causes COVID-19; the term 'COVID-19' refers to the disease], but more likely to represent better initial diagnosis, testing and management than in the early pandemic stages. Mutations in the virus require monitoring, as there is the potential that new strains could be more (or less) virulent. Given our experience with influenza pandemics, it is likely that a number of waves will occur until a successful vaccine is rolled out.

Government public health responses around the world have varied. In Australia, the government's principles are to minimise the number of people becoming infected or sick, minimise how sick people become and reduce the mortality rate, manage the demand on healthcare systems, to assist the population to manage their own risk and the risk to their family and community, support work towards vaccine and make

sure that any future vaccines are available to Australians for free. These principles will require an enormous amount of work, and the time and infrastructure to respond to these will vary from country to country. Countries have taken different approaches to community lockdowns, international and within country travel, infection control measures (such as mask use), etc.

An important drive to public health responses is an understanding of how SARS-CoV-2 is transmitted. Respiratory viruses can be transmitted in a number of ways: droplet transmission which requires individuals to be within a metre or so of each other, aerosol transmission where virus can spread beyond one or two metres, and fomites where the virus survives on surfaces for prolonged periods of time. There is increasing evidence that aerosol transmission is important in SARS-CoV-2 transmission, which makes it somewhat different to influenza and other respiratory viruses. Certain events promote aerosolisation of viral particles – these include within hospitals (intubating patients, collecting swabs) and in the community (singing, being in enclosed spaces). During COVID-19, closed environments such as aged care facilities, cruise ships, and hospitals have been important contributors to the spread of SARS-CoV-2.

An important response to the outbreak has been aggressive and early laboratory testing. Countries with early high rates of testing (such as Australia, New Zealand, Singapore, and Taiwan) have generally fared better than countries who, although now testing large numbers of people, implemented widespread testing more slowly. There is also an issue of access of testing in different countries due to cost and reagent or kit availability. As community serostudies to detect SARS-CoV-2-specific antibodies are undertaken, it is likely that the currently reported rates of laboratory-confirmed infection are a significant underestimate of the true numbers of cases. Technology has allowed the laboratory enhancement of public health responses. For example, the ready availability of rapid whole genome sequencing of SARS-CoV-2 has allowed clearer identification of COVID-19 clusters, thus enhancing responses to such clusters.

A major impact on the world economy has been the reduction of international travel, and even almost 12 months after the start of the pandemic, international travel is yet to return to anything like pre-pandemic levels. This obviously has a significant impact on the economies of all countries, particularly those highly dependent on tourism.

A large range of antiviral drugs and immuno-modulators have been trialled in COVID-19 disease. At this stage, there is no 'standout' antiviral agent for either severe or mild disease. Successful antiviral therapy is complicated by the need to identify cases quickly, a problem given that a large proportion of patients are asymptomatic or only mildly symptomatic. Such people, of course, can still transmit the virus.

A successful vaccine against SARS-CoV-2 is the most likely way to control the pandemic and to minimise disease severity. Over 50 vaccines are in clinical trial, and another over 150 other vaccines are in pre-clinical study. Some vaccines have already reported high rates of efficacy, and others have fallen by the way side. Producing an effective vaccine is one thing, but being able to provide the world's population with two doses of the vaccine is an enormous logistics task. The vaccine studies have been rapid, and long-term safety data in all age groups is still required. It is also unknown how long immunity to SARS-CoV-2 will last, whether immunity is induced by natural infection or vaccination. It is yet to be determined if annual vaccination (like with influenza) is required. ■

This article is a summary of the presentation given at the FAOPMA-Pest Summit 2020 Virtual Conference.

Prof. Dominic E. Dwyer is the Director, NSW Health Pathology Public Health Pathology State-wide Service; and Director, NSWHP- Institute of Clinical Pathology & Medical Research, Westmead, NSW, Australia. Prof. Dwyer was also on a select team under the auspices of the World Health Organization to investigate the origins of SARS-CoV-2.
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Mental Health Now and Beyond the Pandemic

Strategies to survive the mental stresses of the COVID-19 pandemic

Maria Lourdes Fabia

An unprecedented year, COVID-19 has presented us the ironies of life.

As social beings, we need to be with others, we need to have that sense of belonging, and yet the best way to help and protect others is to have social distancing for collective well-being. *We learned how to live with this.*

As life presents challenges of scarcity, not having opportunities to meet others, to access places we want to visit, to do the things we used to do, we are presented with opportunities to focus on the essentials and blessing of life. It is for us to have that perspective in looking at what's good in the life that we have today. *We learned to appreciate.*

As life presents so much uncertainty, we are challenged to re-focus on how we can make things more certain by zeroing on things where we have control over, where we can have influence, where we can take action. *We learned to accept and navigate the reality.*

We have seen how COVID-19 has presented us the great opportunity to be more human, to reset and truly focus on the essentials in life. This crisis has made us feel a lot of difficult, intense emotions, feelings and made us experience unusual stresses in life. We all had to make adjustments, we all had to figure out how to cope and we all had to figure out how to live with the pandemic. During this period, more and more people are needing help on how to function better amidst crisis, how to tackle our mental health issues and how to be resilient given the uncertainty.

Research showed that the next pandemic is Mental Health. And what should we be doing about it?

This article presents practical tips and tools as we strive to strengthen our mental health during this extra challenging period.

Train the Mind to be Calm

One of the hardest things to do these days is to be still and be quiet so we can pay attention to what's going on inside us. It is important to note also that the busier you are the more quiet time you need. When we can choose to mindfully pause even for just 10 minutes daily, we are training our brain to respond and not just react to stressful situations. We are also training our brain to self-validate and acknowledge our emotions. It is important to remember that every emotion is valid, every emotion is a data. When we avoid emotions, they will continue

to dominate or overpower us. What we resist, persists. Training the mind to be calm makes us listen to ourselves.

Make Physical Health a Priority

There is no mental health without physical health. Both are equally important. Let's not forget the basics or essentials on making physical health a priority.

Be Active: make sure to spend at least 10-15 a day of movement or exercise. Spending some time also under the sun contributes to a good night sleep.

Sleep: we all need a sufficient amount of sleep, period. It is essential to feel recharged after sleeping. Here are some practical tips to feel recharged:

- Unplug 30-40 mins prior to sleeping
- Sleep only when you feel sleepy
- Make your bed a place for sleeping, not for working

Eat Healthy: food affects our mood. Keeping a regular plant-based diet is highly recommended for better immunity.

Cultivate Meaningful Relationships

Researched showed that the quality of your relationship is a predictor of your well-being. During this period of pandemic how are you cultivating meaningful relationships? It is important to find or create intentional activities for you to nourish your relationships especially with the most important people in your life.

Choose Gratitude and Hope

Gratitude is an antidote to stress. For one's well-being, it is highly recommended to cultivate a grateful heart, a grateful attitude. I honestly believe that our blessings outweigh all the problems that we have. I encourage you to come up with your own gratitude activity, to just be reminded of all your blessings. Gratitude activities can include a Gratitude Pause each day for a few minutes to recall your blessings or what you are grateful for per day, Gratitude Journal- writing your thoughts about your daily blessings. Writing allows us to centre to what is important to us. It will also be more worthwhile if your insights or reflections are shared with others.

We can all choose to thrive despite the adversity. We just need to make deliberate and intentional choices to take care of our mind, heart and body.

There is no better time to take care of our health. It's a choice each one can make. ■

This article is a summary of the presentation given at the FAOPMA-Pest Summit 2020 Virtual Conference.

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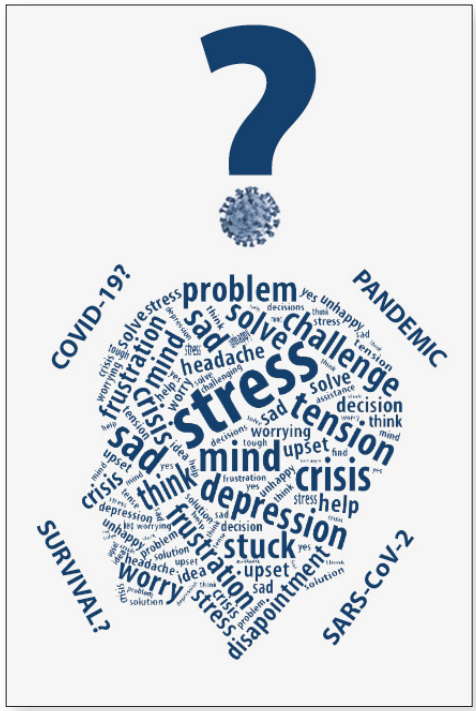
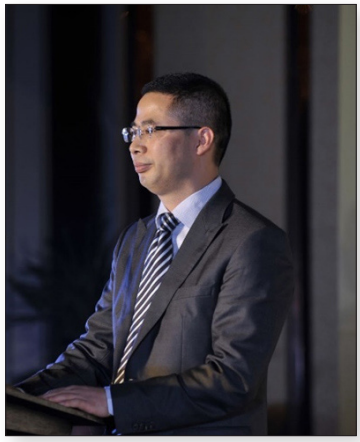




The Important Role Played by Wuhan's PCO Companies in the Prevention and Control of COVID-19

A PCO's perspective on the control of the virus from its origin

Fu Youcai

The 2019 year end saw the unexpected outbreak of the new coronavirus in Wuhan. Wuhan Lifetai Technology Co., Ltd. ("Lifetai") and many other pest control operation (PCO) companies in Wuhan took part in the breath-taking battle against the virus over 100 unforgettable days and nights during the lockdown of the city. Leveraging this opportunity at the FAOPMA Pest Summit 2020, I am honored to represent China, especially the Wuhan PCO companies that engaged in the first-line battle against COVID-19, and to share our experience in preventing and controlling the epidemic. Here, I would like to express my special thanks to Dr Huang Xiaoyun of the Chinese Pest Control Association (CPCA) for her recommendation and encouragement.

PCO Companies Rose to the Challenge in the Darkest Moment

At the turn of 2019 to 2020, the COVID-19 epidemic broke out in Wuhan, leading to the lockdown of the whole city on January 23, 2020.

At the beginning of the outbreak, the number of cases rose rapidly, causing panic throughout the city. The epidemic led to an instant shortage of medical resources and even paralyzed the city's medical system. Its impact on families, communities, the public environment, and society was unprecedentedly huge.

At the time, we were told that COVID-19 may be transmitted through droplets, aerosols, and contact. In light of the serious situation, we had to take immediate action, such as quarantine and disinfection, to stop the spread of the virus.

Disinfection is not the main line of business for PCO companies, though we had experience of disinfecting during the SARS epidemic, the Wenchuan earthquake, and the floods of the Yangtze River 17 years ago. However, the scale and duration of our participation in disinfection work, as well as the number of participating PCO companies was pretty limited. As the outbreak of COVID-19 had led to serious shortages of medical resources, the infection prevention and control departments (IPCDs) of medical institutions were overwhelmed by the disinfection work. As the virus had contaminated all types of sites, the disinfection task was as huge as it was

complicated, making even the Centres for Disease Control (CDC) scratch its head when facing such a tremendously difficult job. China's National Patriotic Health Campaign, initiated in the 1950s, has been widely participated by the Chinese people over the years. China's PCO companies, which are scattered throughout the country, have long become an important non-government supporting force for the Chinese government's health authorities and the CDC. Aside from IPCDs of hospitals, CDCs, and grass root health centers, PCO companies have assumed most of the disinfection work.

Many PCO companies did not have targeted disinfection technology and personnel, nor adequate knowledge and experience in responding to major public health incidents. Therefore, in face of the COVID-19 epidemic, Wuhan's PCO companies were confronted with serious challenges:

- The safety risk was high and may easily cause panic among the disinfectors.
- Running short of people; the outbreak of the epidemic coincided with the Chinese New Year break, when most employees of the PCO companies had returned home.
- Disinfectants and protective supplies ran short.
- Restrictions for operation; after Wuhan's lockdown, people were prohibited from entering or leaving the city, making disinfection operations an even greater challenge.

Totally unprepared, PCO companies were faced with a soul-torturing question; should it rise to the challenge or stand by watching? In the face of the lockdown and the risk of being infected, Lifetai and its peers in Wuhan did not shy away,

Disinfecting the wet markets - 'Ground Zero'.

but rather chose to join the fight against the virus. From that moment on, Wuhan's PCO companies had made up their mind to share weal and woe with the city. We could not predict when the epidemic would end, but most PCO companies did not hesitate to go through an unprecedentedly hard, peril-packed, yet unforgettable journey to disinfect the city.

PCO Companies Played a Key Role at a Critical Moment

In the face of the COVID-19 epidemic, PCO companies made an urgent effort to prepare medical supplies and dispatch them in batches for disinfection and epidemic prevention. Wuhan is a mega city with a population of over 10 million. In the first half month after the lockdown, the demand for disinfection services skyrocketed, far exceeding the supply. Twelve PCO companies, including Lifetai, managed to overcome the fear of COVID-19 and the difficulties arising primarily out of unpreparedness, and delved into the provision of disinfection services. It didn't take long before the second batch of PCO companies engaged in the disinfection for the city.

The contributions of PCO companies could not be possible without the leadership of the technical departments of the Wuhan government and the CDC, among others, as well the support from the CPCA. The Coronavirus Outbreak Prevention and Control Commands at the municipal, provincial, and national level, as well as CDCs at different levels provided technical guidance plans at different stages of the epidemic for different site.

To ensure the movement and safety of the disinfectors during the lockdown, the government provided special permits, as well as food and accommodation, for PCO disinfectors and vehicles.

The CPCA also offered a helping hand to Wuhan's PCO companies in the control of the epidemic by providing timely technical guidance and information support. They put together experts to help Wuhan's PCO companies overcome challenges concerning disinfection technologies; trained disinfectors through the internet; convened a national conference online, for data exchange on disinfection technologies and solutions to fight the epidemic, as well as for information sharing; and recognized outstanding disinfection institutions and individuals. The Wuhan Pest Control Association provided information on professional disinfection institutions to the government and the general public, helped PCO companies optimize the disinfection plans, and also organized leading

Disinfecting hospitals.

experts to visit PCO companies.

PCO companies took targeted disinfection measures for different types of sites and pollutants in accordance with the infectious disease control principles and the disinfection technology guidelines formulated by the technical department of the government. Wuhan's PCO companies formulated disinfection plans in line with the infectious disease control principles. We adopted three disinfection measures: controlling the sources of infection, cutting off transmission, and protecting the susceptible; stuck to the principles of "early detection, early reporting, early isolation, and early treatment"; carried out targeted and tiered prevention and control measures at different stages of the epidemic; and put our focus on protecting the key places and the susceptible. At different stages of the epidemic, we took targeted measures to disinfect sewage, dirt, sites, and objects that may have been contaminated. We didn't neglect any dead ends or gaps, nor did we disinfect excessively.

We disinfected various types of sites against different pollutants, including: (1) The source of the outbreak. (2) All medical institutions admitting COVID-19 patients, 16 shelter hospitals, hundreds of isolation sites, and other related venues. (3)

Disinfecting sewage systems.

Disinfecting air conditioning ducts.

Septic tanks, domestic sewer pipes, and sludge that had been contaminated by the virus. (4) Medical waste, transfer vehicles and transfer sites. (5) Offices and residences of personnel engaging in the anti-epidemic work. (6) High-risk places such as elderly care institutions and prisons. (7) Logistics and transportation hubs, supermarkets, pharmacies, banks, vehicles and other places which had some limited access. The disinfected area, the number of sites disinfected, the duration, complexity, and risk were unprecedented for all of us.

After the lockdown was lifted and work and production were restored, the government organized the PCO companies to systematically disinfect the venues admitting COVID-19 patients and isolation sites, to restore a safe and clean environment for the Wuhan people. The city carried out a series of preventive disinfection activities at more than 20 types of sites such as schools, kindergartens, supermarkets, and movie theaters, before allowing the resumption of work. Centralized ventilation systems in public places were also thoroughly disinfected.

PCO companies overcome many difficulties concerning disinfection technologies thanks to the support of experts in various disciplines.

Take Lifetai for example. The following technical problems concerning disinfection have been solved by consulting experts from the CPCA. (1) Disinfection of sewer sludge; how to effectively disinfect contaminated sludge without breaking the sewer pipes. (2) How to disinfect medical devices, such as negative pressure devices and ventilators with lumen. (3) How to disinfect massive numbers of medical and daily supplies for COVID-19 patients. (4) How to disinfect the dome of shelter hospitals, which are more than ten meters high. (5) How to disinfect fecal sewage in temporary hospitals and isolation sites for COVID-19 patients. (6) How to disinfect oxygen cylinders in shelter hospitals and ad-hoc remodeled hospitals. (7) How to disinfect facilities for storing frozen foods.

Leveraging our experience fighting the coronavirus in Wuhan, Wuhan's PCO companies dispatched representatives to provide professional disinfection services for other cities with sporadic cases and cluster outbreaks.

PCO Companies Achieved Remarkable Results during the Hundred-Day Lockdown

The PCO companies' disinfection work was recognized by government authorities and widely acclaimed by the society. By virtue of their quick response capabilities and well-trained professionals, PCO companies have become an important new force to prevent and stop the spread of the epidemic, and a powerful leverage for relevant government authorities, because they are very cooperative and responsive to problems concerning the epidemic.

PCO companies' achievements in disinfection have been highly acclaimed by all walks of life. Wuhan citizens say that they feel much more assured when seeing all the places disinfected

and they feel like their life has returned to normal.

Disinfection contributed greatly to the control of the epidemic in Wuhan. Three months after Wuhan's lockdown, the epidemic was basically under control. From the onset to March 16, 2020, the total number of confirmed patients in Wuhan was 50,004, among which more than 40,000 recovered and were discharged from hospital. By late March, Wuhan had not seen any new local cases for two weeks. Therefore, on April 8, 2020, the Wuhan Municipal Government announced the cancellation of lockdown, and the resumption of work and production in turn. Over the past months, there have been no local cases in Wuhan, which is largely attributable to the disinfection measures as an important means for the prevention and control of COVID-19 in Wuhan. The PCO companies providing disinfection services and all the disinfectors faced the risks and made a continuous effort to fight the virus, thereby winning the recognition of the society.

During the disinfection process against the epidemic, Wuhan's PCO companies attached great importance to the personal protection of their employees, and didn't make any obvious mistakes. As the new coronavirus is highly infectious, disinfectors must overcome tremendous fears to be able to work. It can be said that they were risking their lives to carry out each disinfection operation. For PCO companies and disinfectors, safety and protection were extremely important, and meant a great deal in terms of avoiding corporate risks, stabilizing the team, and enhancing confidence.

Take Lifetai as an example. During the epidemic, none of the over 500 disinfectors were infected. The reason behind this success is that Lifetai attached great importance to personal protection training by organizing its employees to watch videos regarding how to put on and take off the personal protective equipment (PPE) every day, and to put the techniques into practice. We were stringent with the quality of PPE we purchased, and asked our employees to wear or replace PPE according to the protection level. Before each disinfection operation, we would carry out strict inspections over the PPE. We made a continuous effort to strictly disinfect the offices, vehicles, and residences of the disinfectors so as to prevent them from participating in disinfection operations without proper personal protection. The government and technical authorities also advocated and strictly inspected the protective measures of disinfectors. Public health physicians working at national, provincial, and municipal-level CDCs also offered professional protection guidance to the disinfectors. Physicians in medical institutions carried out personal protection inspections and technical guidance before disinfectors entered the contaminated areas or even during the disinfection operations. Lifetai's backbone employees, who had an educational background in public health and experience in the fight against SARS, played an exemplary role in the fight against COVID-19.

The nature of the work of the disinfectors determines that they must have a strong awareness of preventing diseases to protect themselves. Their working and living environments are always disinfected, which is why they are less susceptible to infection.

As epidemic prevention and control becomes the new normal, it is important to take strict measures to prevent another outbreak in the autumn and winter months. Wuhan and other Chinese cities have entered a stage of normalized epidemic prevention and control, and Wuhan's PCO companies have been prepared for recurrence of the epidemic in the autumn and winter of 2020.

Wuhan hasn't seen any local cases in the past few months, and has allowed the resumption of work, production, and school. But it is still advisable to stay vigilant against the virus and incorporate measures for epidemic prevention and control into our daily life. It is still necessary to keep good hygiene habits, such as wearing masks, washing hands frequently, partying less, and maintaining social distance, and be mentally ready for the possible recurrence of the epidemic. As autumn and winter approach, when respiratory infectious diseases frequently occur, we must take strict steps to guard against the possibility of sporadic cases and cluster outbreaks in individual areas.

It is necessary to prevent the spread of the coronavirus from outside the city and make an effort to promote the disinfection and epidemic prevention at office buildings, shopping malls and restaurants. In line with the region-specific,

Disinfecting schools.

multi-level targeted approach to epidemic prevention and control, Wuhan is identified as a low-risk region whose main task at the time being is to prevent the spread of the coronavirus from outside the city. PCO companies must pay attention to the disinfection of the following sites, and take targeted measures to foster ventilation and sanitary habits, and strengthen epidemic prevention by promoting environmental health: (1) Venues with concentrations of people coming from the hardest-hit regions and high-risk areas, such as isolation sites. (2) Fever clinics and COVID-19 detection points. (3) Urban and rural communities, government agencies, enterprises and institutions, schools, kindergartens, elderly care institutions, welfare homes, etc. Regarding these specific sites, it is necessary to disinfect particular areas, such as the centralized ventilation systems, septic tanks, sewer pipes, and food storage devices of cold storage and refrigerators, in accordance with laws and regulations.

Wuhan's PCO companies have been fully prepared for recurrence of the epidemic that may happen at any time while doing the normalized prevention and control through disinfection.

Thoughts and Suggestions after the Control of the New Coronavirus

Can disinfection be an extensional business of PCO companies? Most PCO companies mainly engage in the provision of professional pest control services. The extremely fast spread of COVID-19 posed a great challenge to effectively mobilize disinfection resources at a short notice. But it was this special predicament that prompted PCO companies to assume the disinfection task. It was a desperate move. Luckily, PCO companies had a natural advantage in this regard, as reflected in their ability to quickly mobilize local resources. More than one hundred companies participated in the disinfection of various infective sites. They could effectively provide targeted services in compliance with regulations. Thanks to their regular connection with the disease control groups, during the lockdown period, Wuhan's PCO companies cooperated with government authorities in an orderly manner to quickly control the epidemic, and effectively made up for the shortage of disinfectors in hospitals, grassroots

health centres, and other relevant organizations.

The uncertainty of the external environment makes it nearly impossible to predict when the infectious disease will strike again. Therefore, aside from continuing with vector control services, PCO companies may explore disinfection as an opportunity and an extension of their main line of business, because our expertise enables us to implement the disinfection work rapidly. Our work during the fight against the new coronavirus has won the recognition of the society, which greatly improved our social status and company value. Therefore, we will continue to pay more attention to the disinfection business. It is suggested that PCO companies with technical and talent reserves should explore disinfection services as an extension of their business.

Is there a lasting demand for disinfection services by PCO companies? As the new coronavirus has not been eliminated worldwide, there is still demand for disinfection services in Wuhan and beyond. If the epidemic recurs, the demand will further increase. The catastrophic consequences of the epidemic have raised people's awareness of the importance of disinfection. As a result, medical institutions, food companies, supermarkets, schools, kindergartens, airports, and train stations may require PCO companies to provide preventive services to disinfect the air and hard surfaces. This need for disinfection will abate as the epidemic goes away and the normal state of life is restored. In other words, in Wuhan and even throughout China, the demand for disinfection services arising from the coronavirus is pretty limited in terms of both intensity and duration. New disinfection needs will only arise when other natural disasters, such as geological disasters and floods, occur to the prevent epidemics and other subsequent disasters. Therefore, the opportunities and demand intensity of disinfection services for PCO companies are sporadic, unstable, and uncertain, quite unlike vector control services whose demand is stable or fluctuates with the season.

What do PCO companies need to prepare before engaging in the disinfection work? Today, as COVID-19 is not under control globally, I suggest that when undertaking disinfection work, PCO companies establish close contact with the epidemic control authorities, collect in time the information on the changes in the epidemic, and pay attention to the formulation of disinfection emergency plans and the reserves of disinfectants and protective equipment. It is also necessary to standardize the management of medicines and equipment in epidemic warehouses, strengthen the training of disinfectors on disinfection operations, and conduct drills according to the emergency plan. In doing so, the disinfectors will be able to start their job immediately after the epidemic strikes.

Suggestions. Wuhan and other Chinese cities have entered a stage of normalized epidemic prevention and control. Wuhan's PCO companies have become fully prepared for a recurrence of the epidemic in the autumn and winter of 2020. Meanwhile, we wish to exchange experiences with other PCO companies in the Asia-Pacific region. We suggest that an information exchange platform be established so that we can obtain professional technical guidance from FAOPMA and share the practical experience of disinfection with our peers.

The sudden strike of the epidemic allowed us to experience this special period in history. By cooperating with the government, the CPCA, and our peers, we shouldered our social responsibility, and made a continuous and an effective effort to disinfect the city, thus gaining more recognition from the society. The process was packed with perils and difficulties, which tested our ability to coordinate in complex environments, our perseverance and teamwork in emergency, our ability to work in an orderly manner in various environments, and our resolve to overcome epidemics. Through the experience, the social value of PCO companies has been enhanced and our determination to assume the mission has been strengthened. I believe that through closer collaboration, the PCO industry in all countries will be able to survive these difficult times, convert challenges into opportunities, and usher in a better tomorrow! ■

This article is a summary of the Mr Youcai's presentation at the FAOPMA-Pest Summit 2020 Virtual Conference.

Mr Fu Youcai is the Chairman of the Board of Wuhan Lifetai Technology Inc.

The Impact of COVID-19 on the Pest Management Industry in Asia-Oceania Region

The results of a survey of the industry in the region

Raymond Lee

Introduction. With the global COVID-19 pandemic, it is without a doubt that the COVID-19 situation has impacted every segment of business operations and every sector of the economic markets. It is an unprecedented event and many businesses are not excluded from the impact, including the pest management industry. Many of us have been have been taken by complete surprise with the way things have been unfolding. Many businesses are forced to scale back their operations due to lack of demand for services and products; a chain reaction when consumers are no longer spending and that is when more businesses start to fail. We can envisage that with the consumers struggle to make ends meet, it is no longer business as usual and retail outlets have been forced to close.

The seriousness of the domino effect is certain and it is observed that many businesses will still struggle to make ends meet. It is not surprising to note that many businesses are now finding it hard to keep up with their expenses. The severity of the COVID-19 impact on business is considered unprecedented as COVID-19 started as a health crisis but over a period of time it quickly evolved into a global economic crisis at a speed which many of us were astonished and magnitude we have not witnessed in our lifetime. The devastating effects are still unfolding on a global scale.

There are many questions which we find it hard to comprehend during such challenging and uncertain times. Against this backdrop, FAOPMA initiated a survey on the impact of the COVID-19 upon the Pest Management industry in the Asia/Oceania region. It is hoped that the survey would provide data in order to form an understanding of how the industry is impact and to provide information to Suppliers and Manufacturers to determine how best to work with local PCO in collaborating together to recover from the impact of COVID-19. The survey identified areas that were impacted, plus opportunities created during the pandemic, and key challenges and concerns faced by Pest Control Operators (PCOs) in Asia/Oceania. This paper reports on the findings of the survey.

Purpose of the Survey and Study: The main purpose to conduct this study is to determine the impact of COVID-19 on the Pest Management industry in the Asia/Oceania region.

The findings of this survey will help the FAOPMA to determine the economic impact of the Industry and its effects on the business operations of

the PCO. This brief survey can help FAOPMA to better understand how COVID-19 is affecting the regional Pest Management business and how FAOPMA can best support her members during these challenging times.

Background to Survey

The survey was held online and received some 522 responses from Pest Control Operators or companies involved in the Pest Management industry in the Asia/Oceania region who are mainly country members of FAOPMA.

Data Analysis and Descriptive Analyses

Descriptive analyses as conducted to answer the main objectives of the study on the impact of COVID-19 on the pest management industry in the Asia/Oceania region. The data responses where statistically analysed in order to assess the impact and effects on the Industry. Moreover, the descriptive analyses also serves as the basic foundation for determining the association between the independent and dependent variables of the study.

The geographical country regions, profile of the PCOs, which includes their years of experiences in the industry, business services segments ,and total annual turnover measured in terms of sales where examined in order to examine the impact of COVID-19 in relation to the business.

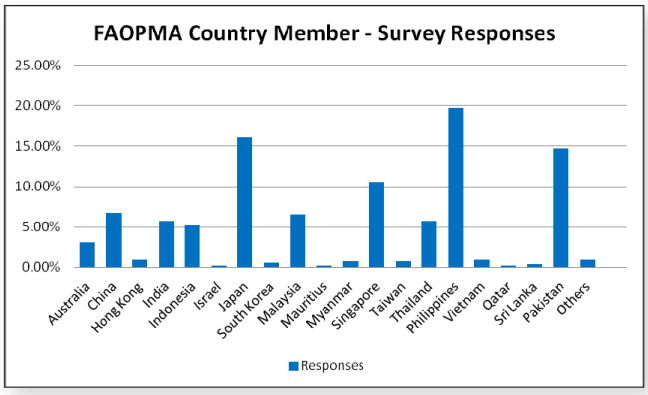
The changes in business operations due to the impacted business areas encountered, the government supported provided in each region, and the problems encountered are presented.

Demographics and Organizational Profile

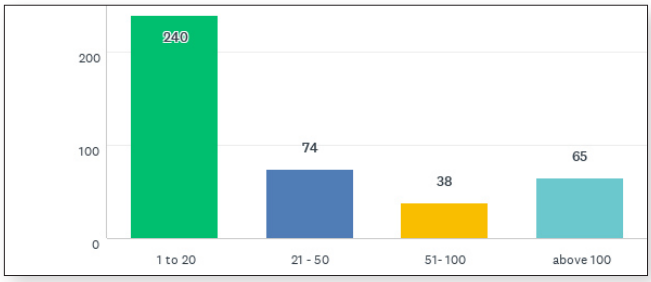
To determine the organizational profile for this study, the employee size, type of services provided, and years of involvement in the Pest management Industry were asked. This helped to determine the expertise and the business capacity of these respondents in withstanding the impact of the COVID-19 pandemic. The type of business services provided, included:

(a) General Pest Control Services & Termite Baiting,
(b) Sanitation & Hygiene,
(c) Fumigation,
(d) Equipment & Chemical supply,
(e) Disinfecting Services for COVID-19.

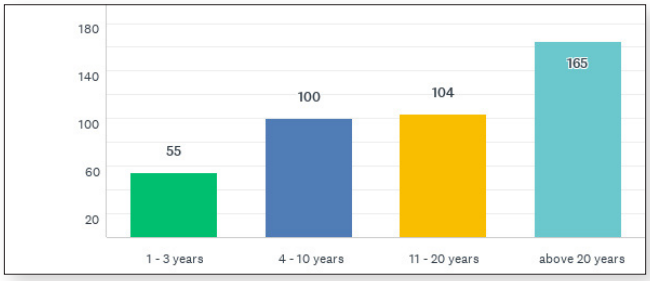
Question 1 focused on the country of origin of the respondent.



Q2: Organizational Profile - Employee Size



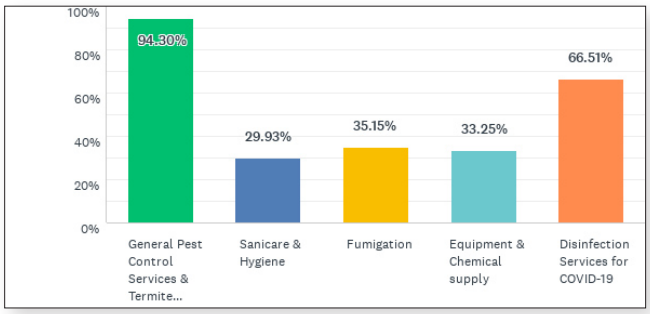
Q3: Organization Profile - Years of Experience in the Pest Control Industry



Significant findings:
a) The majority of the respondents (58%) were considered small to medium PCOs employing less than 20 employees and it is noted that only 16% of the respondents employed more than 100 staff. Although the study shows a high percentage (58%) are considered small to medium PCOs, it

is interesting to note that 64% had accumulated more than 10 years industry experience with 40% having more than 20 years industry experience.

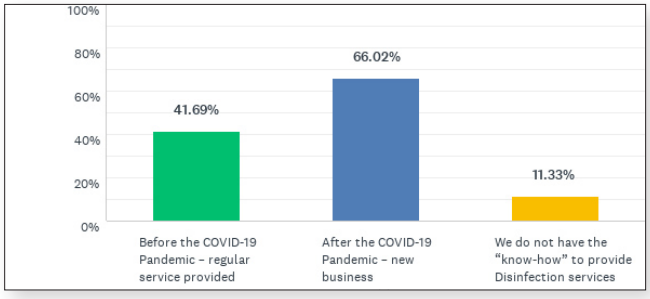
Q4: Type of Business Services Provided



Significant findings:
a) The findings of this study showed that 94% of the PCO respondents are involved in general pest control and termite baiting, and it is noted that 35% of the pest services provided is for fumigation and 33% for the supply of chemicals and pest control equipment.

As indicated by the study, 67% of the PCO respondents are involved in providing disinfection services against COVID-19.

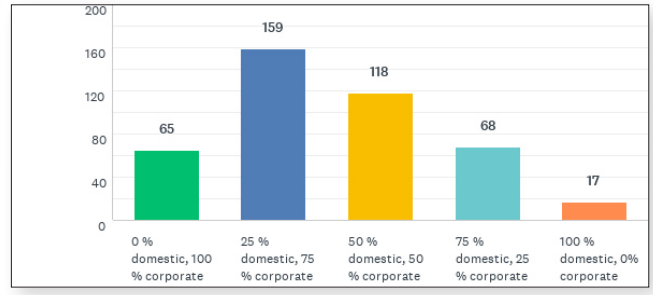
Q5: Do you Provide Disinfection Services?



Significant findings:
a) A significant finding of this study showed that 66% of the PCO respondents are now providing disinfection services following the emergence of the COVID-19 pandemic. This is now seen as a new business opportunity, in comparison with 42% indicating that disinfection services have been a part of their regular services before the COVID-19 pandemic.
b) A small (11%) indicated the lack of "know-how" to provide disinfection services

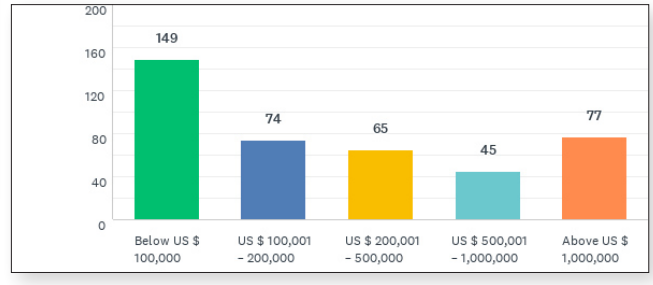
Taking into consideration the situation, it is noted that the COVID-19 pandemic has provided some significant opportunities for the PCOs to provide disinfection services. Thus the survey explored the ability of the PCO to provide such services and their expertise or the "know-how" to provide disinfection services.

Q6: What is Your Mix of Domestic to Corporate Servicing?



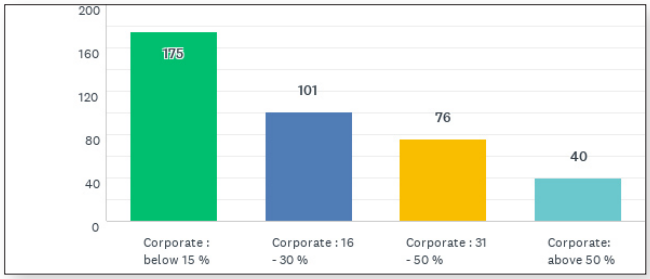
Significant findings:
a) Overall, around 35% of the respondents have a breakdown of 75% corporate to 25% domestic clients, and this formed the main customer mix.
b) An estimated 28% have an equal balance of 50% of customer mix. It is interesting to note that a very small percentage of 4% depended 100% only on the domestic customer.

Q7: Estimated Annual Sales (USD$), Based on 2019 Year Annual Sales:



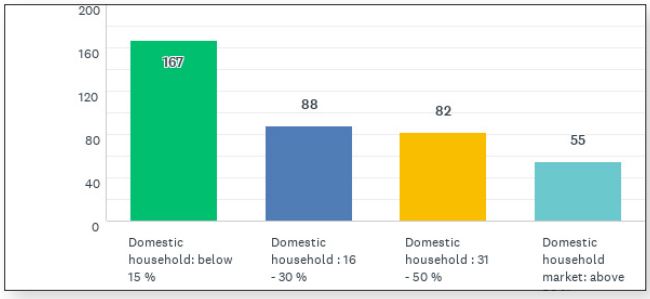
Significant findings:
a) The survey revealed that 70% of the PCOs have an annual turnover of up to USD$500,000.00.
b) A significant 36% have an annual turnover of USD$100,000.00 and this is consistent with the demographic profile that shows 60% are considered as small to medium operators.
c) Those who have an annual turnover of USD$1 million or more only make up 18%.

Q8: If Your Business Has Been Affected, What Percentage Decline Have You Seen in the Last 6 Months for Corporate Services?



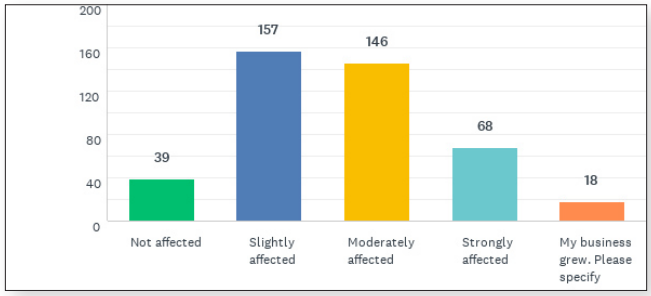
Significant findings:
a) A significant finding of this survey showed that 45% of the respondents experienced a 15% decline in their corporate market segment, while an estimated 26% of the respondents experienced a 16-30% decline in their corporate market segment.
b) Around 20% reported a decline of 31-50%, while it was surprising to note that 10% of the respondents recorded a drop of more than 50% in their corporate market segment.

Q9: If Your Business Has Been Affected, What Percentage Decline Have You Seen in the Last 6 Months for Domestic Services?



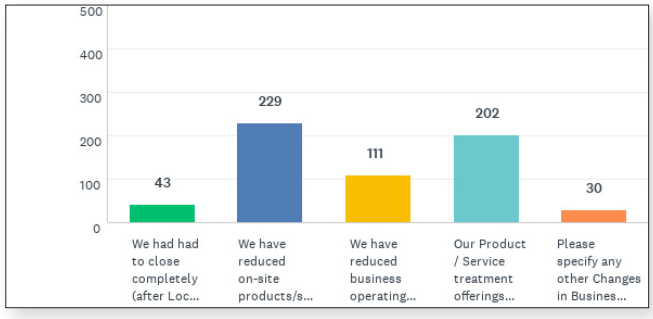
Significant findings:
a) A significant finding of this study shows that 43% of the respondents experienced a 15% decline in their domestic market segment, while an estimated 23% of the respondents experienced a 16-30% decline in their domestic market segment.
b) Around 21% reported a decline of 31-50% while it was surprising to note that only 14% of the PCO respondents recorded a drop of more than 50% in their domestic market segment.
Note: It is interesting to note that the COVID-19 pandemic has not unduly influenced one market over the other.

Q10: How Has Your Business Been Affected by COVID-19 Pandemic?



Significant findings:
a) The severity of the COVID-19 impact on business is considered unprecedented and the respondents were not excluded from the impact. The study revealed two extremes of the impact.
b) Around 10% of the respondents indicated that the business was not affected by COVID-19 in any way.
c) Some 16% reported that the business was strongly affected, which is relatively a small percentage of the industry.
d) Some 73% indicated that their business has been either slightly or moderately affected by the impact of the COVID-19 pandemic.
e) The significant positive impact revealed in this study shows that a small percentage (4%) of the respondents experienced growth in their business which specifically was due to the disinfection services.

Q11: Changes in Business Operations



Significant findings:
a) Nearly half (56%) of all companies surveyed indicated that they had to reduced on-site service

treatments or visits due to reduced customer appointments, and similarly, 50% indicated that services and products offerings have to change due to customers' demands.
b) Most of the changes in the business operations were affected to some degree (27%) by the changes brought about with movement control orders and lock downs. This led to reduced business operating hours or limited communication with customers.

Q12: Changes in Workforce and Employee Size when Normal Business Operations are Resumed

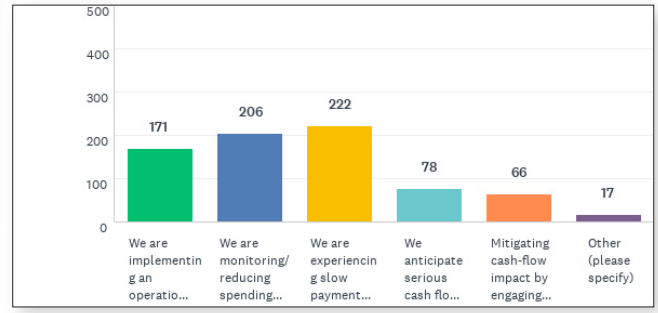
Significant findings:
a) The findings of the survey in relation to changes in workforce and employee size when normal business operations resume indicated that nearly 62% of the companies are concerned with the health and safety of the employees. To mitigate the risk of COVID-19, 30% have reduce the working hours of technicians.
b) An estimated 10-12% have anticipated a reduction and indicated that layoffs and retrenchments of workforce has occurred.
A small percentage (14%) reported cost cutting measures such as a reduction in employee wages, allowances and staff benefits, due to the impact of the pandemic with the changes in workforce and business operations.

Q13: Changes in Sales Activities

Significant findings:
a) The most significant change (37%) in sale activities has been the reduction in sales inquiries.
b) It was observed that the 33% increases in sales inquiries are mainly derived from disinfection services.
c) Price competition during the COVID-19

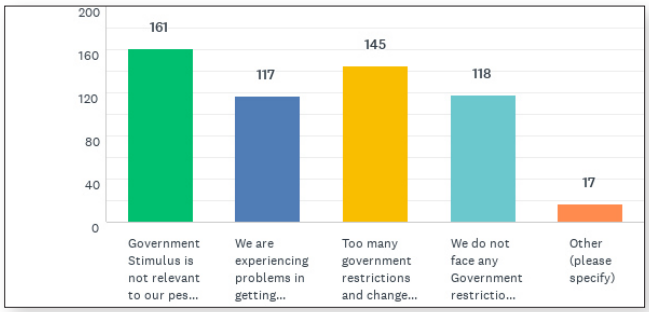
pandemic is also being experienced by 35% of the PCOs probably due to limited market opportunities.
Contract termination due to economic uncertainty was reported by 29% of the respondents.

Q14: Changes in Finances



Significant findings:
The changes in finances can be noted from the following measures adopted by the PCO respondents:
a) 44% indicated implementing cost reduction as a strategy.
b) 53% cited that monitoring expenses and reducing spending will be implemented due to the uncertainty of the impact of the COVID-19 pandemic.
c) The impact is faced by about 20% on the changes in finance which resulted in the serious cash flow problems to meet business operations.
d) Most of the PCOs (57%) are experiencing slow payments from customers, which contributed to the cash flow.
The study also showed that 17% of the PCOs managed to mitigate the cash flow by engaging with the customers and suppliers.

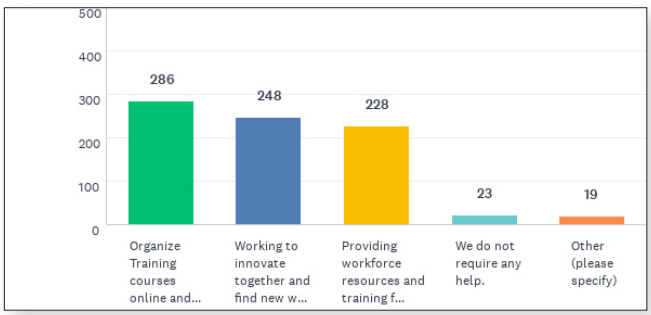
Q15: Issues Encountered During COVID-19 and Government Support/Assistance



Significant findings:

a) Slightly more than one-third (41%) of the PCOs cited that the government stimulus is NOT relevant to the industry.
b) About one-third (30%) of the PCOs cited experiencing problems in obtaining support and financial assistance from their government.
c) Some 37% reported that too many government restrictions and changes are required for undertaking business during the pandemic. About one-third (30%) of the PCOs indicated that they do not face any government restrictions during the COVID-19 pandemic.

Q16: FAOPMA is trying to Identify Ways That We Can Best Support the Pest Management Industry Community during the COVID-19 Pandemic. How Can We Best Help Your Pest Control Business Navigate This Situation?



Significant findings:
a) Close to two-thirds (71%) of all member countries indicate that FAOPMA needs to organize training courses online and virtual meetings for education and discussion forums.
b) Close to 62% of all member countries suggested that working to innovate together and to find new ways to support the regional industry is necessary.
c) Most member countries (56%) indicate that FAOPMA should consider providing workforce resources and training for pest control industry certification requirements.

HIERACHY of 'Fear Factor' During the COVID-19 Pandemic.

Thus the survey question focused on the main 'Fear Factors' during the COVID-19 pandemic. The total responses selected by respondents were ranked in terms of most concern (No 1) to least concern (No 10) for these factors. The mean score for each factor was then used to rank the importance of each Fear Factor.

Rank	HIERARCHY of Fear Factor	Mean Score
1	Safety & Health of employee due to COVID-19	7.94
2	Financial impact - Cash Flow problems	7.52
3	Fall in Customer demand and Sales	7.10
4	Reduced employee productivity	7.07
5	Business closure - Temporary	5.54
6	Employee retrenchment & lay offs	5.02
7	Bank financing and Loan repayments	4.38
8	Employee salary Freeze and removal of Bonus	4.29
9	Disruption in supply – insecticides & equipments.	4.28
10	Litigation	2.41

Significant findings:
a) The key survey findings from the impacted business areas and the fears concerned in relation to the impact of the COVID-19, Safety & Health

of employee was recognized as important this is consistent with the earlier findings which also showed the findings (Q12) of this study in relation to Changes in Workforce and Employee Size when normal business Operations resume indicated that nearly 62% of the PCO are concern with the health and safety practices of the employees. It is important as it indicates that the pest service company considers Safety & Health of employee as paramount importance in comparison with the profits and business.
b) The other factors related to the impact of COVID-19 in relation to the business, operations and financial Impact on the PCO companies. An equally important factor to be considered is the financial impact - Cash Flow problems which has been discussed in the findings in Q14 in which the impact is faced by about 20% on the changes in finance which resulted in the serious cash flow problems to meet the business operations. Similarly, most of the PCO (57%) are experiencing slow payment from customers which contributed to the cash flow.
c) The rankings are fears and concern of the impact that has been expressed by the PCO companies. These outcome factors seem to be consistent with the study concerning the market and the employee workforce. Of least concern expressed by the respondents – litigation impact on the business.

SUMMARY OF THE SURVEY FINDINGS

1. COVID-19 Impacts on the Pest Management Industry; Financial Cash Flow:

Top Challenges Encountered in the Industry and Identified in the Survey:
a) Most of the PCOs (57%) experienced slow payment from customers which contributed to cash flow problems.
b) Cost of operations – PPE & safety equipment were required for employees for their health and safety. Some 62% of the companies have clear concerns about staff health.

Actions Recommended:
a) **Cash Flow**: the survey showed that 17% of the PCOs managed to mitigate the cash flow by engaging with the customers and suppliers. Other options includes cash flow management.
b) 44% indicated that they implemented **cost reduction** as a strategy and re-prioritized business activities.
c) 53% cited that **monitoring expenses and reduced spending** will be implemented due to the uncertainty of the impact from the COVID-19 pandemic.
d) Nearly half of all PCO companies surveyed indicated that cost-cutting measures are a priority.

Interventions Needed:
a) The findings of the study showed that obtaining support and financial assistance from the government was very important. This included stimulus packages and wage subsidies as enacted in Australia, Japan, and Malaysia.

2. COVID-19 Impacts on the Pest Management Industry; Business Operations/Marketing:

Top Challenges Encountered in the Industry and Identified in Survey:
a) Price competition during the COVID-19 pandemic is being experienced by 35% of the PCOs probably due to limited market opportunities.
b) Contract termination due to economic uncertainty was reported by 29% of the PCOs.
c) There was an overall 43-45% decline in sales revenue (in both the domestic and corporate segments).
d) The most significant change (37%) in sales activities recorded was a reduction in sale inquiries.

Actions Recommended:
a) Most of the respondents noted that frequent communication with customers is key to planning and managing customer relationships.
b) The survey revealed that 17% of the PCOs managed to mitigate the cash flow by engaging with customers and suppliers.
c) Some respondents have undertaken new operations and business processes to suit the pandemic, by working from home and/or having reduced working hours.

3. COVID-19 Impact on the Pest Management Industry; Staff:

Top Challenges Encountered in the Industry and

Identified in Survey:
a) An estimated 10-12% have anticipated a reduction with layoffs or retrenchment of part of their workforce.
b) A small percentage (14%) reported cost cutting measures including reduced wages, allowances and staff benefits.
c) Most of the changes in business operations were affected to some degree by the changes due to movement control movement orders or lock downs.

Actions Recommended:
a) Adjusting wages or applying for wage subsidies from Government.
b) Close to two-thirds (71%) of all member countries indicate that FAOPMA needs to organize training courses online and virtual meetings for education and discussion forums.
c) Close to 62% of all member countries suggested that we need to work together in order to innovate and to find new ways to support the regional industry.
d) Most member countries (56%) indicated that FAOPMA should consider providing workforce resources and certification for the pest control industry.
e) Employees need to have clarity about the new normal working processes and ensuing expectations. They need to enhance their remote working approaches with technical and connectivity support.

4. COVID-19 Impact on the Pest Management Industry; New Business Opportunities

Top Challenges Encountered in the Industry and Identified in Survey:
a) As indicated by the study, 67% of the PCO respondents are involved in disinfection services against COVID-19.
b) A significant finding of this study shows that 66% of the PCO respondents are providing disinfection services after the COVID-19 pandemic and recognises this as a new business opportunity. In comparison, 42% had disinfection services prior to the pandemic.
c) A small percentage (11%) indicated the lack of "know-how" to provide disinfection services.
d) It was also reported that the 33% increase in sales inquiries was mainly derived from disinfection services.

Actions Recommended:
a) The significant positive impact discovered in this survey shows that a small (4%) of the respondents experienced growth in their business which specifically was due to the disinfection services.
b) Invest in the new sector of disinfection services and diversify.

CONCLUSIONS

a) The survey suggests that the concerns of pest management businesses vary across different geographical regions and the main concern is a potential global recession.
b) A Pest Management company that weathers a crisis well understands that adversity is a concealed opportunity for growth or change.
c) The global pandemic has affected every nation on this planet and we all will continue to face a difficult time ahead. At the same time, we know that our long-term business strategy will need to change, too.
d) Companies need to plan to emerge from this COVID-19 disaster as strongly as possible and bed educated by experts in order to adapt to the demands of the new normal.
e) It is clear that the COVID-19 pandemic will have a devastating impact on the regional and more so, the global economy. While it is uncertain as to when the pandemic will end, it is important that pest management companies respond quickly and appropriately to minimise impact, to recover, and to emerge stronger. In terms of responding – perhaps a good start would be to consider the findings for cash flow management described in this paper. ■

This article is a summary of the Dr Lee's presentation at the FAOPMA-Pest Summit 2020 Virtual Conference. See also the papers from various Associations on the impact of COVID-19 in their nation, under FAOPMA Member News in this issue.

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TECH TALK - Insect Growth Regulators (Part I Juvenile Hormone Analogues)

An introduction to how IGRs function

Steve Broadbent

Looking at Insect Growth Regulators (more commonly called 'IGRs') brings me in a full circle on my career as an entomologist. After first working in Veterinary Investigation with cestodes, I moved up the Phylla to become a Research Scientist at the then Ministry of Agriculture, Farming and Fisheries (MAFF), Pest Infestation Control Laboratories in Slough, UK. In this position I worked with juvenile hormones with a range of insects including Pharaoh's ants, house flies, German cockroaches and my specialisation, which resulted in my first paper, 'Cross-resistance to Juvenile Hormone Analogues in a Multi-resistant Strain of *Tribolium castaneum* TC-14'. This was pretty cutting edge at the time, since this was 1974, and juvenile hormone itself had only been identified in 1965. So it's fun to be back here looking at these unique insecticides.

Essentially there are two types of insect growth regulators in urban pest markets, Juvenile Hormone Analogues (JHA) and Chitin Synthesis Inhibitors (CSI). In this issue we will focus on the Juvenile Hormone Analogues. JHAs are synthetic chemicals that work by mimicking the naturally occurring juvenile hormone in insects. So let's start by looking at what juvenile hormone is and what it does.

Juvenile hormone (JH) controls reproduction and maintains the insect in the juvenile state. When juvenile hormone is present in the insect, it promotes larva-to-larva moults. When reduced levels occur, it promotes pupation, and in the complete absence of JH, the insect moults through to the adult stage.

Juvenile Hormone Analogue insecticides work by mimicking the presence of natural JH. They do not kill adult insects. So JHA treated larvae are unable to successfully change from pupae to the adult insects. This breaks the biological life cycle of the insect and prevents recurring infestation.

JH has been isolated and chemically identified as a *sesquiterpenoid*. Four have been identified, but only JH-III (the trimethyl form) is present in all insects, (JH-0, JH-I and JH-II have only been identified in Lepidoptera). Whilst a great deal of progress has been made over the past 50+ years,

knowledge of how JH works at the molecular level remains elusive. JH regulates an unusually large diversity of processes during post-embryonic development and adult reproduction. It is a long-standing conundrum in insect developmental physiology as to how one hormone can have such diverse effects.

It was first discovered as the hormone that represses metamorphosis, hence its name of juvenile hormone, and then later in stimulating aspects of reproduction. Since then, its many actions in reproductive processes have been noted, and in many species it is known to be the primary co-ordinator of reproductive processes, including the production of eggs in female insects. From an evolutionary perspective, its role in reproduction probably preceded its metamorphic role.

Juvenile hormone ensures the growth of insect larvae, while preventing metamorphosis. It is secreted by two endocrine glands behind the insect brain known as the *corpora allata*.

Juvenile hormone (JH), as the name suggests, maintains the insect in the juvenile state. The level of JH found in the haemolymph gradually decreases during the development of the insect, allowing it to proceed to successive instars with each moult. For an insect to moult to the next stage (instar), the correct ratio of JH and *ecdysone* must be present. Ecdysone is a primary moulting hormone that is necessary for insects to go from the larval to pupal stage.

In essence, when JH is present, ecdysone promotes larva-to-larva moults. When reduced levels of JH occur, ecdysone promotes pupation, and in the complete absence of JH the insect moults through to the adult stage. Ecdysone is a steroidal pro-hormone of the major insect moulting hormone, 20-hydroxyecdysone, which is secreted from the prothoracic glands.

JH is degraded (broken down) by the enzymes *Juvenile-hormone esterase* (JHE) or *juvenile hormone epoxide hydrolase* (JHEH). JHE and JHEH both lead to suppression of JH signalling and response.

Juvenile Hormone Analogues (JHAs) are designed to mimic the effects of JH and disrupt these endocrine-regulated processes that are relatively unique to insects. Consequently these insecticides tend to be very low toxic to non-target organisms.

The main examples found in the urban pest market are pyriproxyfen, fenoxycarb and s-methoprene. Typically these products are used for the developmental control of mosquitoes, fleas, flies, and cockroaches.

The mechanism of toxicity of JHAs is still in question. They do not kill adult insects. Thus, with fleas and mosquitoes, these products work by mimicking the presence of natural juvenile hormone. As mentioned above, JH must be absent for a pupa to moult to an adult, so JHA treated larvae are unable to successfully emerge from the pupal form, to the adult insect. This breaks the biological life-cycle of the insect, thus preventing recurring infestation.

In cockroaches, where there is no pupal form, the high level of JHA in the larval stage causes deformations when the insects moult, which usually lead to death.

JHAs also affect egg production. The mode of this differs depending on the compound. In one study, when adult fleas were exposed to residues of pyriproxyfen, they produced eggs devoid of yolk, frequently with collapsed walls after oviposition; and there was no blastoderm formed (the layer of cells from which the embryo develops). In contrast, eggs laid by methoprene treated fleas showed no gross morphological effects, though the eggs either did not hatch, or the larvae died within hours after hatching. Histological examination revealed most of the eggs contained segmented embryos, which apparently died during blastokinesis (a bending of the embryo in the process of embryonic development). ■

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FEATURE

Did COVID-19 Affect Rodents in Your Country?

Please complete this survey to better gauge the influence of the COVID-19 pandemic on rodent activity

Yasushi Kiyokawa

We, Yasushi Kiyokawa at The University of Tokyo, Japan, and Michael H. Parsons at Fordham University, USA, are now assessing the effects of social distancing on the emergence of rodents in Asia and Oceania. As a valued pest management professional, I would like to kindly ask for your participation in this survey. We need your help to systematically clarify the situation in your country. You can answer in your own language. We do not collect personally identifiable information. It should take approximately 1-2 minutes to complete. We would appreciate it if you kindly answer the survey by March 2021. If we receive a sufficient number of responses, we will report the results of the analyses in this magazine as soon as possible. Thank you in advance for your kind cooperation.

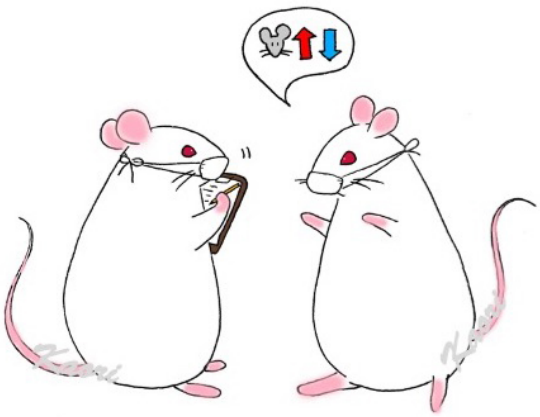
How Everything Started

Following widespread social distancing to curtail the spread of SARS-CoV-2 [the virus that causes COVID-19] in spring 2020, increased sightings of rats in close proximity to people were broadly circulated in popular English media [see an example the July 2020 issue of the FAOPMA Magazine, https://faopma.com/JournalDetail/4046/FAOPMA_Magazine_2020_July].

Given that urban rats are global commensal organisms that depend on humans for food, shifts in human behaviour as a result of social distancing will have pronounced effects on nearby rat populations. However, the limited number of personal experiences and/or theoretical speculations on media provide virtually no information regarding how widespread the increased sightings are in the world. In addition, a part of the increase could be an artefact of social distancing. For example, citizens have altered their daily routines and started to stay in different places at different time. This could lead to new sightings of a pre-existing rat population even if the population itself has not changed at all. Therefore, systematic research is required to clarify the effects of social distancing on rodents.

We first analysed whether social distancing changed the number of public service calls in New York City (NYC), USA, and in Tokyo, Japan. We chose these cities because the data recorded in the 311-system [a non-emergency phone number used for complaints] and Tokyo Pest Control Association (TPCA) enabled us to trace the number and location of each phone call. We found that the lockdown increased the number of phone calls in proximity to closed food service establishments in NYC. Similarly, a state of emergency declaration

http://www.vm.a.u-tokyo.ac.jp/koudou/survey_index.html



日本語で回答する
使用语言：简体中文
한국어로 답변하기
jawab dalam bahasa Indonesia
Sila jawab dalam Bahasa Melayu
Mẫu trả lời khảo sát bằng tiếng Việt

Answer in English
使用語言:繁體中文(台灣)
ภาษา (ภาษาไทย)
اردو زبان میں جواب دینے کے لیے یہاں کلک کریں
සිංහලෙන් පිළිතුරු සපයන්න
उत्तर हिंदी में दीजिए

Survey website.

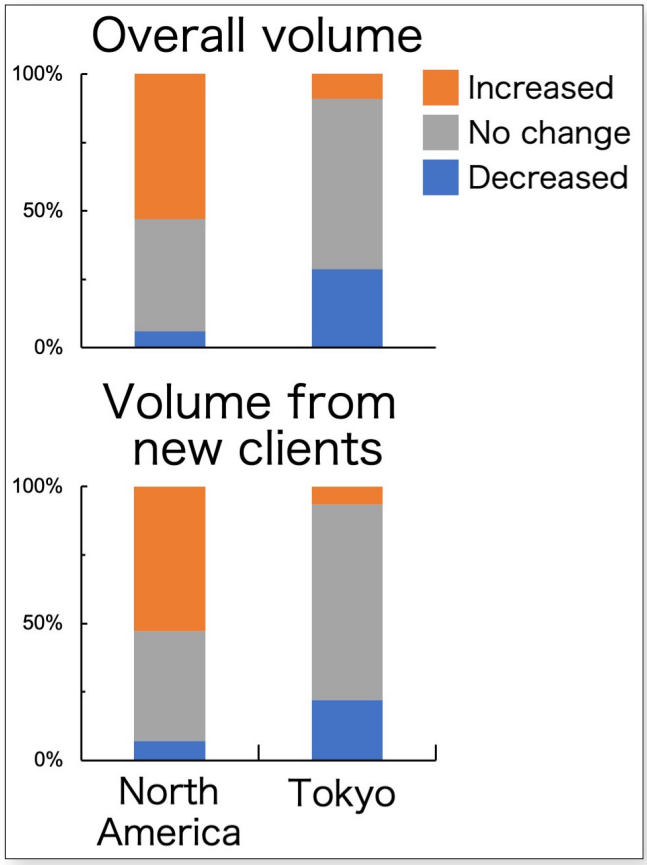
(stay-at-home order) increased the number of phone calls in the restaurant-dense eastern side of Tokyo. Therefore, the increase in rodent sightings seemed to be a common phenomenon in NYC and Tokyo.

The Impacts on Society were Contrasting in Tokyo and North America

Next, in order to assess the impacts of increased sightings on our society, we distributed the above-mentioned survey sheet to pest management companies in North America and the eastern side of Tokyo (TPCA members in 23 Wards). We obtained 50 and 82 responses from North America and Tokyo, respectively.

In the survey, we first asked if social distancing affected the overall volume of rat-related calls or jobs in the respondent's company. We found that the volume was increased in more than half of the respondents in North America (53%). In contrast, only 9% of responses from Tokyo reported an increase. The majority of the responses (61%) indicated that there was no change in the volume of rat-related calls or jobs. Next, we asked if the volume of rat-related calls or jobs from new clients was changed by social distancing. Similar to the first question, more than half of the respondents from North America (53%) reported that they had more calls from new clients. This is in contrast with the responses from Tokyo (7%). Again, the majority of the responses indicated that the volume was similar to a typical year (71%).

These results revealed that the impacts on our society were contrasting between North America and Tokyo. In North America, the increases in public service calls were accompanied by increased business in pest management companies. In addition, business from new clients also increased.



Changes in the overall business and business from new clients by social distancing.

These changes suggested that social distancing forced rats to move to new areas, which negatively impacted society. In contrast, little change was observed in the pest management companies in Tokyo, even if the number of public service calls was increased. Therefore, social distancing made virtually no impact on the society in Tokyo.

A Possible Hypothesis for the Limited Impacts in Tokyo

One possible interpretation of the results in Tokyo could be that social distancing did not affect rodents in Tokyo. The changes in public service calls were an artefact caused by the changes in human behaviour. Unfortunately, we have no data to deny this interpretation at this time. Nonetheless, we believe that a more probable interpretation is that the limited impacts were ascribed to the predominance of roof rats [also known as 'black rats', *Rattus rattus*]. In Tokyo, brown rats [also known as 'Norway rats', *Rattus norvegicus*] are found in the downtown area and usually consume garbage placed street-side at midnight and collected the following morning. In contrast, roof rats inhabit the inside of smaller buildings and feed on food stocks, grease vats, and oil stains in restaurants and bars. Although social distancing dramatically decreased the amount of garbage placed street-side in the downtown area, restaurants and bars remained open for 'take-away' meals in the daytime. Therefore, it is highly probable that social distancing differentially affected the two rat species. Specifically, social distancing forced brown rats to roam in order to find alternative foods sources. In contrast, roof rats experienced little effects of social distancing. When we think about the proportion of the two types of rats in Tokyo, our survey simultaneously clarified that the proportion of roof rats is much higher than that of brown rats (roof rats: 79%, brown rats: 21%). Therefore, the number of roaming brown rats was estimated to be small. In addition, it is difficult for brown rats to invade the buildings in Tokyo because they were built to prevent entry of roof rats. As a result, the roaming of brown rats was not perceived as important enough to hire a private pest control specialist.

The Aim of the Coming Survey

One of the best ways to assess this hypothesis would be to survey the effects of social distancing in countries with different proportions of rodents. We expect that the impact of social distancing decreases when the proportion of roof rats increases. Unfortunately, mostly due to the lack of information available from Asia and Oceania, European and American people believe that the situation in their countries is applicable worldwide. One example is the belief that the world is threatened by rats' movement caused by social distancing. However, as our previous survey revealed, the situation in Tokyo was totally different from that in North America. Therefore, I believe this is a great opportunity to systematically clarify the situation in Asia and Oceania and to understand and manage rodents in the world more comprehensively. Thank you in advance for your kind cooperation. ■

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Usefulness of Conventional UV Light Traps in Capturing Stored Product Pests

Preserving the safety of food for human consumption

Partho Dhang

Introduction

Food production under HACCP requires all impurities or foreign objects, including biological contaminants such as pests to be kept out from the premises, the production process and the final product. Raw materials are usually the critical route where stored product pests make their entry into the food processing procedure. Even though fool proof methods for their elimination can be implemented once they are noticed, their earliest detection continue to remain a challenge.

There are many methods which have evolved over time to detect stored-product pests in bulk grain, food processing, and retail environments. These include the use of visual methods by sampling the products, detection methods such as using chemicals including pheromones, and physical detection through the use of traps. However, it is common knowledge that methods involving the capture, detection or trapping requires considerable knowledge of the pest biology, behaviour, and ecology.

Trapping the pest eventually helps gather the correct nature of information on the distribution dynamics and helps to pin-point the source of the infestation. Unfortunately, to the author's knowledge, there is no single protocol available to date to determine the best capture method. Another challenge in capturing and detecting stored product insects comes from the fact that these pests are often sedentary, cryptic and remain concealed deep inside commodities. Stored product insects often are also active at night when they search for food, mate, and shelter (Toews and Nansen, 2012). In addition, insects have natural movement influenced by many factors. Work showed that only 6% of red flour beetles were moving at any given time (Campbell and Hagstrum, 2002). Also, there are a number of stored pests which are not capable of flight, these even though are attracted to light or

a pheromone, may not be captured in a trap situated at some distance.

In spite of these limitations most stored products can be monitored by traps of varying designs. These pests are captured with traps using various types of attractants such as pheromone, food baits, sticky coloured boards, and light. Even though such traps are extremely limited in providing population data, they are much more effective than visual counting. Also, these traps do not necessary reflect correctly on overall pest populations as many of the pests may not be mobile or capable of flying, or in a position to be attracted. But practitioners with experience have used multiple traps and trap types to determine spatial distribution of pests and use the data to implement management strategies.

UV Lights as an attractant to stored pests

Light traps using ultraviolet (UV) light are a popular tool in capturing flying insects in food establishments. They are designed primarily for houseflies. In spite of this, it has been shown that light traps can be effective in attracting and trapping stored product pests. Research on this aspect is available and evidence of firsthand field use has been documented.

Light traps use light as an attractant to capture the insects. These traps are powered by bulbs emitting a light in the ultraviolet range, constituting 315 to 400nm wavelength. The principle of operation is that flying insects are attracted to the light and are captured or killed when they enter the trap through the front grill and get stuck on the glue board. Some stored product pests are attracted by

light of wavelengths between 280 and 600nm: and others to wavelengths in the green light region measuring between 500–560nm (Rees, 1985). A similar observation showed that some stored-product insects, such as the Mediterranean flour moth adults in particular, are more attracted to electroluminescent green light than to UV light (Soderestrom et al., 1987). Nualvatna et al. (2002) found that light traps were useful for capturing Angoumois grain moths, lesser grain borers, maize weevils, and red flour beetles in rice mills and paddy seed stores. Hagstrum et al. (1977) found that the rate of female almond moth captures increased when a black light was included on the trap compared to separating the lamp from the trap; no differences were observed for male almond moth captures. In another study, light trap size and light trap location was shown to be important criteria in capturing of cigarette beetle, *Lasioderma serricorne* (Waguri et al., 2016).

Conclusion

Light traps are useful tools for detecting stored product pests. It also serves as an additional methodology in running IPM programs in this sector. However, practitioners must identify their limitation when employed. They may not be suitable for all types of pests. Also, the nature of presentation of the light traps, such as intensity of the light and the design of the trap may play a significant role in the attraction of the insect pests. It has also been shown that the response of the insects toward an attractive light source is also influenced by the insect species, age, sex, temperature, and other environmental conditions, as well as intensity of surrounding light and photoperiod (Rajendran, 2005). Rees (1985) reported the location and position of the traps are crucial factors in trapping stored product insects. At the business end, the decision on which trap to use is heavily influenced by price, and under these circumstances it is important to recognize the importance of having as many trapping stations as is feasible, a must requirement to get the best results (Toews and Nansen, 2012). ■

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Bed Bug Global Summit 2020

A virtual event featuring latest and greatest from the world of bed bugs

Stephen L. Doggett

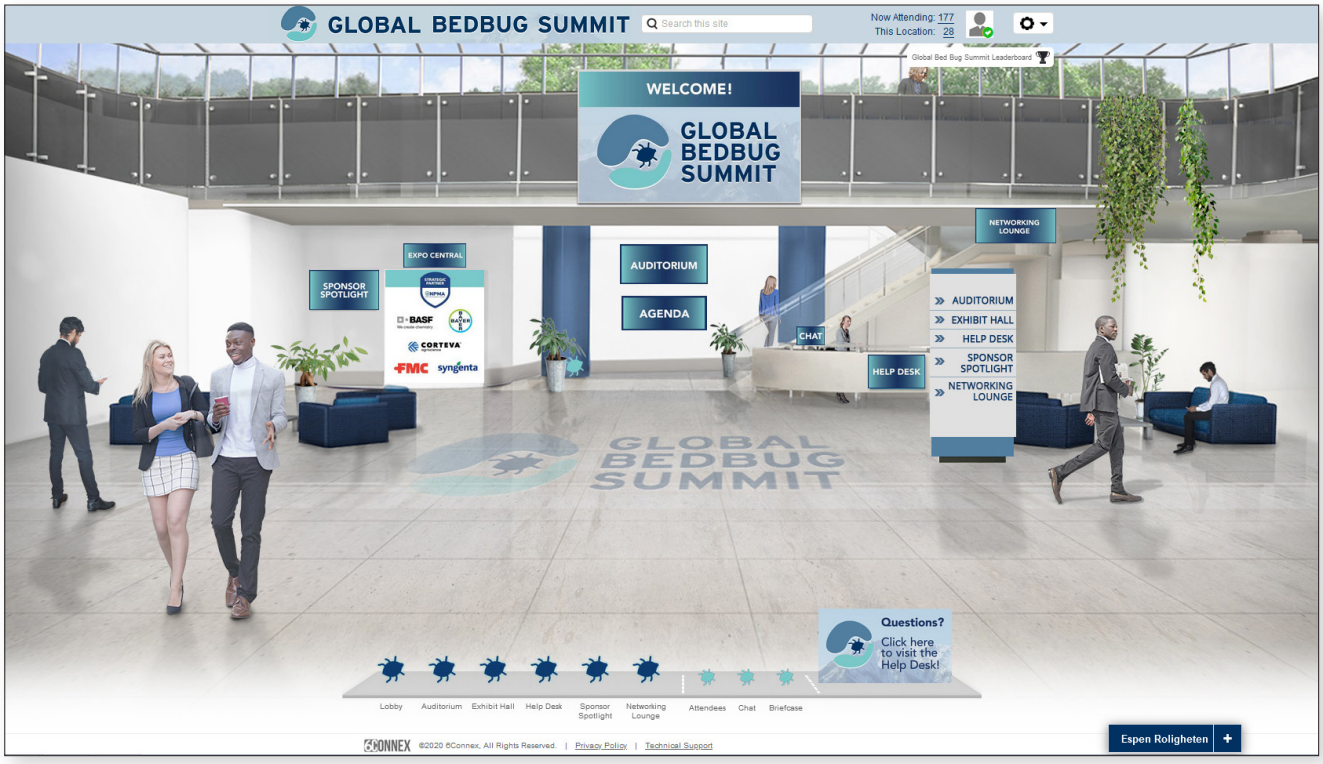
The Global Bed Bug Summit (GBBS) has been a biennial event held in the US since 2010. It was initially called the North American Bed Bug Summit and was established by Bed Bug Central, one of the leading pest management firms involved in bed bug management. In more recent times, the National Pest Management Association (NPMA) has joined forces with Bed Bug Central, and as a consequence the meeting changed its name, although there is still a very strong emphasis on what happens in the US. I have attended most of these over the years and been honoured to speak on three occasions at the event.

Unfortunately like the majority of pest management conferences in 2020, the GBBS had to be held virtually for the safety of all and the event was run over two days, 2-3 December, with some 280 participants attending. There is no question that the presentations by the experts in the field is the greatest attraction to the meeting, however there were also a number of virtual exhibition booths, and other attractions including networking sessions and the opportunity to speak with the experts.

The presentations were many and varied, and covered technical aspects in bed bug management, the latest research in clinical aspects and insecticide resistance, there were presentations on bed bug monitoring and use of canines for detection, control in specific situations such as offices, legal aspects and policy, challenges caused by the COVID-19 pandemic, proactive control, biopesticides, and more. Thus there was an extremely comprehensive range of talks to suit all stakeholders involved in bed bug management.

Due to the large time zone difference, I did not listen to the talks live (and there were some disadvantages in this), but fortunately all presentations were made available for later viewing. Thus I will review the talks more or less in the order I watched them.

The first presentation I watched was by Dr Zachary DeVries of the University of Kentucky, whose title was "Understanding the full potential of bed bugs as an important public health pest". It is well known that cockroach allergens contains substances such as histamine that can trigger respiratory issues including asthma, and Zach raised the question if bed bug allergens (which also contain histamines) can also lead to respiratory distress. Importantly, it is known that cockroach control can lead to a reduction in allergens. Zach sampled for histamines bother before and after bed bug management. Even 12 weeks after the bed bugs were eradicated, histamine levels still remained very high with no decline. Thus histamines appears very stable in the environment. Furthermore, as bed bugs are so linked with our sleeping habits, there is a great potential for humans to be exposed to the

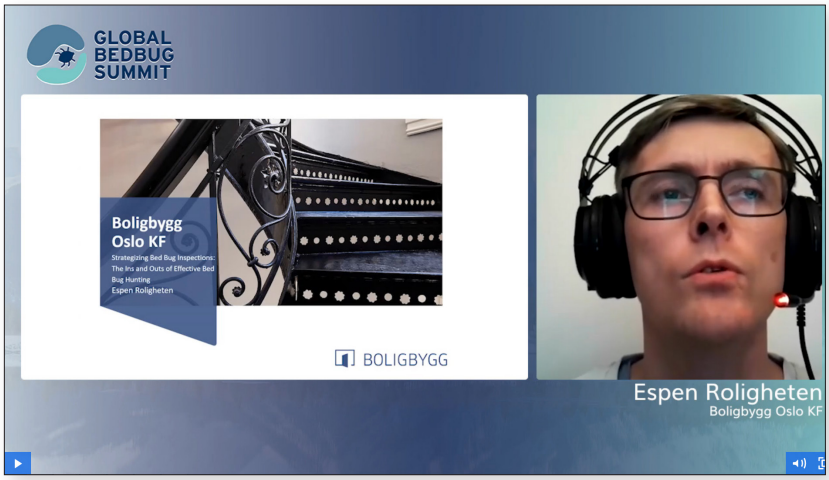


The virtual atrium of the Bed Bug Global Summit 2020.

allergens. Thus it appears that that histamine accumulates in household dust from bed bugs and if histamine does trigger respiratory issues, then bed bugs could be a serious risk to our health. It may be that deep cleaning will be needed in order to remove the histamines. However to date, there no link between bed bug histamines and adverse health effects, and further research is required.

The next talk was by someone I was unfamiliar with; Sarah Latyn, from Bed Bug Central, Lawrenceville, NJ, who provided an overview on bed bugs. Sarah admitted at the start of her presentation that she had only worked with Bed Bug Central for two years and her talk reflected this lack of experience. When she mentioned *Cimex tropicalis* towards the start of the talk instead of the correct species name, *Cimex hemipterus*, I knew we were in trouble! She then suggested that the widespread application of DDT may have led to the resistance we see today, but completely ignored the fact that natural pyrethrin had been used for decades and this chemical confers cross resistance to the organochlorides. Next she stated that "body odor" attracted bed bugs…umm not quite…Overall, it was a poorly structured talk, with little discussion on the factors behind the resurgence. Unfortunately worse was to come. Following each presentations are a series of questions to allow pest managers in the US to earn Continuing Education Units (CEUs) for recertification. The problem was that several of Sarah Latyn's questions had the wrong answer, which may have compromised some attendees who were aiming for recertification. In my opinion it was not appropriate to have someone with such little experience speak at a conference when conference fees were so high; this is simply unfair to paying registrants.

Fortunately the program went from not so good to brilliant and next up was the living legend, Prof. Dini Miller from Virginia Tech, USA, who examined fumigation for bed bugs. Dini initially provided an overview of the history of fumigation, which included sulfur dioxide and hydrogen cyanide, both being widely used prior to WWII. Unfortunately, sulfur dioxide is a poor ovicide, while hydrogen cyanide is very toxic and resulted in the deaths of a number of applicators. DDT and the organochlorides changed the way bed bug control was undertaken and introduced a safer and highly effective means of bed bug



Espen Rolighten from Norway describing his 'Building Wide' strategy to combat bed bugs.

management. That is, until resistance surfaced, particularly in the modern strains associated with the current resurgence. Now it is very challenging to control bed bugs especially when they infest people's belongings. Thus Dini and her team looked at using the fumigant, sulfuryl fluoride, to control bed bugs in challenging situations. Basically a number of vehicles and trailers where obtained, which were filled with belongings, and bed bugs held in containers placed inside. Everything was then covered in tents for the fumigation process and the gaseous insecticide applied. Fumigation was conducted for six hours, the tents were aired, and the bed bugs removed and inspected for mortality. None of the bed bugs, nor their eggs survived, which demonstrated the effectiveness of fumigation in difficult to treat situations. Expect to see a publication from this work in the near future.

A good colleague of mine, Espen Rolighten from Norway, gave a presentation on strategizing bed bug inspections. He is responsible for pest control in some 11,000 apartments in the capital of Norway, Oslo. Since 2013, there has been a dramatic increase in pest control costs due to bed bugs. Thus Espen implemented a process of Building Wide Inspections (BWI), whereby teams of two will inspect up to 50 apartments in a day. They will spend five minutes per apartment looking for bed bugs, and if none are found, will schedule a reinspection for some 10-12 weeks later. This protocol is used when more than three rooms are infested in the same apartment. Effect of implementing the BWI process is that the number of infested rooms in buildings have declined and control costs have decreased; a terrific outcome for all!

Similarly, Dr Karen Vail from the University of Tennessee in Knoxville, undertook Building Wide Inspections (BWI) in a number of properties. By employing two pitfall style monitors, and undertaking a 'quick' inspections that involve a three minute check of the exterior of the mattresses and furniture, they were able to detect bed bug infestations that were missed on 80% of occasions. Incorporating this method into BWIs in three buildings, up to 85% of the infestations were identified that were previously unknown.

Both Espen Rolighten and Karen Vail face a similar situation; a lack of money to undertake the job properly. Thus they both had to compromise with the available resources and ended up with a remarkably similar protocol.

Prof. Chow-Yang Lee, University of California, provided a global perspective of insecticide resistance in bed bugs. He noted that around $USD1 billion is spent on bed bug control in the US alone. Unfortunately resistance can evolve very rapidly, as quickly as 7-10 generations in the field and 15 generations in the laboratory. Due to insecticide resistance issues, the challenge is now managing bed bug reservoirs, namely low income housing, especially as the budget for treatment maybe only $USD5 per resident. What is needed is a low toxic, cost effective and time efficient management strategy, but sadly none are on the horizon.

A colleague of Prof. Lee from the University of California, Dr Dong-Hwan Choe, presented on a new Bayer bed bug detection product. This device is called a 'lateral flow test' that detected bb specific proteins and is based on urine home pregnancy tests. Dong-Hwan collected samples from a bed bug infestation and sent them for

Bayer for testing. The device was accurate 87.8% of the time when bed bugs were present and 97.5% accurate with no bed bugs. Personally, I cannot see the point of such a system when bed bugs are mostly easily detected. Perhaps it could be used for validation that no bed bugs are present in the hospitality sector. Clearly we require more information on this utility of this device.

In the US, litigation is an ongoing concern and typically the GBBS meeting has a number of presentations focusing on legal aspects. One of the better talks was by Gail Getty of Getty Entomological Research and Consulting, CA. Gail spoke on bed bug litigation and how to keep yourself out of hot water. The essence of staying 'legal-safe' in a litigious country such as the US is through documentation, and cases can take 2-7 years before they appear in court. It is important to record everything including work orders, public health records, pest company service records, invoices, and even tenant files. Work orders and bed bug complaints should include the unit number, date/time received and date/time pest control scheduled, if it is ok to enter home, description of work requested, the job status (temporary repair, parts on order), etc. Your service record may include the order number and invoice, location and full address, full date including scheduled date, and list the targeted pest. Include the results of each unit separately. If no evidence is found this should be documented individually. It is important to write out the full date rather than just numbers. The service record should include time in and out, as the court often asks if this time is long enough to complete the job. It is important to describe any challenges to the inspection and the job (e.g. clutter, rushed by tenant). The technician's name and licence number should always be recorded. The service record should also include the service description; details of the initial inspection and follow up inspections, along with if the surrounding units were inspected. Record when the request was made to undertake the inspection and to whom the request was made. Always record the conditions and observations, such as if tenants have done what was requested. Record level of clutter, sanitation, and other conditions impeding prevention or treatment. The service record should define the 'infestation', such as where you found the bed bugs, as well as the level of the infestation, and even the number of bugs seen. Include a comment section, such as discussion points with the tenant/management, the treated areas in units, if the surrounding areas were inspected, if clutter needs to be removed, management/tenant compliance, and any other findings. Even record why a unit could not be inspected. With the treatment, list the product name or product number, and record how much was applied. All of this advice from Gail is really relevant to any job you do, even in countries that have little litigation.

Certificate received upon the successful completion of the 15 question test attached to the presentation.

A session was held where three pest control companies discussed the impact of the COVID-19 pandemic on their bed bug work. Most felt that bed bug work has declined in recent years, even before the start

of the pandemic, yet during the pandemic bed bug work decreased by around 30%. Generally people were more reluctant to have bed bug work done, especially during lockdown times as they had nowhere to go while the treatment was occurring. Some housing groups cancelled all canine inspections, although the reasons behind this were not stated.

As always, Dr Rick Cooper one of the founders of Bed Bug Central always provides a terrific presentation. In his talk he focused on how to effectively use low-prep or no-prep protocols for managing bed bugs. Many pest managers advise clients to undertake a lot of preparatory work prior to a bed bug treatment. This may include stripping beds, removing items from under the bed, laundering clothes, from dressers, closets, and removing items from walls. However, this is a lot of work and unreasonable if the client is elderly or disabled. Plus the client may not know how to handle infested materials properly and if they are asked to do a lot of work, they simply may not do it. The reality is, is that prep work by the client can disturb the bed bug infestation, leading to its spreading and making control that much more difficult. The alternative is limited or no-prep prior to the treatment. Rick would prefer that the client does not disrupt anything so that the infestation can be more properly assessed in the initial inspection. Yet some level of cooperation will be required, which has be tailored made to the situation and the abilities of the client. The aim of the initial treatment is to eliminate as many bed bugs as possible as most will be on or close to the bed. Then obstacles are created for blood seeking bugs, including the use of encasements, interceptors, and targeted chemical treatment. The goals of the follow up visits include; determining if activity is still present, to identify and address the reasons for continued activity, and to make additional requests for cooperation that could be hampering the elimination of the infestation. Thus while cooperation is essential from the client, we cannot expect them to do too much, otherwise treatment failure will occur.

These are just some of the presentations that were available at the meeting. All up, I would have to say that the program was somewhat 'safe'. Personally, I would have liked to have heard from authors behind some of the more controversial methods of control such as systemic pharmaceuticals (i.e. drugs taken by people that will kill bed bugs when they feed) and bed bug baits. Also, it would have been nice if the Global meeting was more Global and to hear of some of the interesting work going on with bed bugs in Africa and Europe. However, I will admit much of this work has little relevance towards the American pest control industry, the group targeted by thus conference.

As to the conference platform itself, there were a couple of niggling issues. Embedded videos did not play on the recorded presentations. It was not possible to scroll through a presentation; you could only pause or play it once started. There was no indication of where in the talk you are and how much time was left. Most annoying was that if you closed a talk before the end, then you had to sit through the whole thing again to access the password at the end in order to access the exam for the Continuing Education Units for recertification. As talks were around an hour each (and arguably a bit long for a virtual conference), this was a very frustrating! Another curious aspect was the final score for the exam; I was awarded 100.05/100.05 for having all 15 questions correct; not sure about the "0.05". The talks were only available until 31/Dec; perhaps more time seems not unreasonable, plus the registration cost was USD$300, which seems a bit high when the industry is struggling during the COVID-19 pandemic (this costs also highlights the incredible value of the 2020 FAOPMA-Pest Summit Virtual Conference at only USD$50!).

Ok, as per usual I am being hypercritical in the last paragraph, however constructive critique leads to improvement and I will admit to looking forward to attending the Global Bed Bug Summit in the future…when it is safe to do so. ■

Stephen Doggett is the Director of Medical Entomology, Westmead Hospital, Sydney Australia, and the Chief Editor of the FAOPMA Magazine.
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Social Distancing tips from Australia

PCT Field Guides; Spiders & Ants

Book Reviews of Two Classic Field Guides

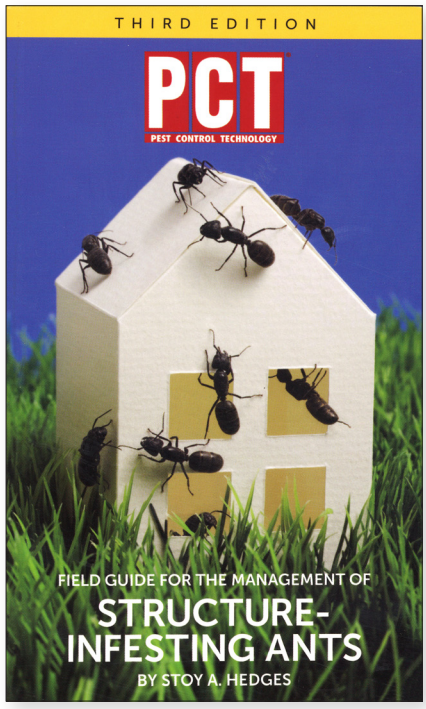
Stephen L. Doggett

Pest Control Technology (PCT) is one of the leading pest management magazines in the US. Beyond the periodical (which is free to subscribe too), PCT holds seminars and sells a range of educational materials including books, a number which they self-publish. In this Book Review, I will critique two of their field guides; Field Guide for the Management of Urban Spiders (2nd Edition) by Stoy A. Hedges, and Field Guide of the Management of Structure-Infesting Ants (3rd Edition) by Stoy A. Hedges.

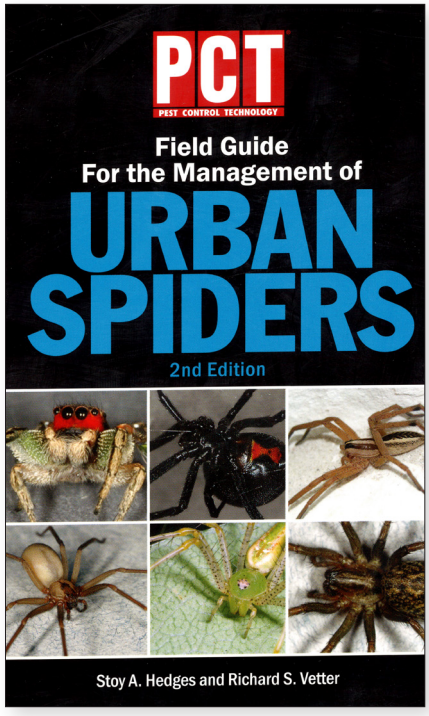
Firstly, we must ask what constitutes a 'field guide'? Compact size? Cheap? Few pages? Easy to read? Both of these books certainly are compact as they only measure 11x18cm and could easily be thrown into your bag. They also quite cheap, ***plus there is a special discount offer for FAOPMA readers only detailed at the end of this article!*** Both books however do contain a lot of pages for a field guide. The spider book has over 250 pages, while the ant guide has over 320. In order for the book to be portable, both utilise quite small fonts to pack in the extensive information; in fact the ant guide does induce some eye strain (and I have never worn glasses). With so many pages and such small fonts being used, these aspects do make both guides more challenging to use in the field. As such, I feel both would have been better has full sized text books and then left in the office as a reference source. To date, there does not seem to be an electronic version available that you could place onto your tablet or phone, which would make the guides more useful in the field. Hopefully the next edition will have an e-book option.

Let's start by reviewing *Field Guide for the Management of Urban Spiders*. I have to say that I have never been a fan of spider management. Generally spiders are not a real problem and rarely a threat to human health (remember that I saying this from the country that has the most deadly spider in the world - the Sydney Funnel web). Many people do not like the cosmetic look of spider webs around the home, nor the spiders themselves, due to some innate irrational fear of the eight legged beast. As a consequence, homes are often sprayed with insecticide when it is completely unnecessary. By brushing away the cobwebs, you take away the spider's snare, and with no prey, it starves to death. Furthermore, spiders are a form of Nature's pest control that can reduce nuisance insects around the home. Plus they are the most fascinating group of arthropods, thus why get rid of them? Curiously, with the Sydney Funnel Web, spraying insecticides around its habitat causes the spider to wander and then it is more likely to enter the home and encounter (and bite) people. Naturally this is all my personal opinion and the reality is that some companies

make good money from clients with spider management, and it is important that the job is done properly, hence the need for expert advice such as that given in the field guide.



Beyond an introduction, the field guide starts with a comprehensive chapter on spider biology. This is followed by chapters on the role of spiders have had in human history, and then health related aspects of spiders, notably the effects of their bite upon people. The care and maintenance of spiders in captivity is followed by a chapter on spider anatomy, which is required for proper identification. Understandably, there is a large section on spider management that features both non-chemical and chemical forms of control. A chapter on identification incorporates a fairly easy to use taxonomic key, although the user would have to possess a decent stereomicroscope to see most of the features. A handy glossary covers many commonly used spider related terms, and numerous references are listed, although most of these are from scientific papers and not readily accessible to someone who does not hold library rights to a tertiary institution.



Included are some 72 colour photographs, which to be honest are only fair in quality – a better flash diffuser would have reduced the harsh shadows and resulted in clearer images (sorry, but I am a perfectionist when it comes to photography!). Hopefully, new photos can be obtained for the next edition. The additional disappointing aspect with the images is that no scale is included; considering the vast difference in size between jumping spiders and huntsmen, the lack of a scale is a notable omission.

More than two thirds of the spider book is dedicated to individual species of spiders. Details for each species includes key identifying characters, biology, inspection tips, and key management strategies for each species.

Ants are without a question serious pests in many countries. In parts of the US, they are the most commonly treated pest in the nation. To the homeowner, ants appear unsightly, may spoil food stuffs, and can enter and damage electrical items and wall cavities. In hospitals, Pharaoh ants can be attracted to the wounds of patients leading to secondary infections. Many ants sting and some species such as fire ants can even result in a life threatening anaphylaxis in hypersensitive patients. Some introduced ant species (including the fire ant) can have a tremendous negative impact on native flora and fauna, and even threaten the existence of vulnerable species.

The challenge is that ant control can be very difficult. Some species are meat feeders, others sugar feeders, while some even swap their feeding preferences at different times. Furthermore, the strategy of insecticide application varies between ants. Without knowing the specifics of feeding behaviour for different ant species or the limitations of the management strategy, then control will not be achieved. Hence the need for high quality pest management

guides.

The structure of the ant book is similar to the other text. Basic ant biology is initially covered, followed by identification (with a taxonomic key), inspection tips, and control strategies. Like the spider book, much of the text is devoted to individual species. There are 48 photographic images captured by Joe MacGown of the Mississippi Entomological Museum, which are superb. Most importantly each image includes a scale. I would have liked to have salient features highlighted on each image, but I feel the shots would have to have been bigger in order to do this, which is difficult in a small field guide.

Obviously both books are geared towards the American market and their species. However, learning about the nuances of the control for individual species will make you a better pest manager for any creature that you are tasked to control.

As noted above, neither text is available as an e-book and herein lies a major issue. The spider book was published in 2012 and the ant text in 2010. Allowing for production time, the information dates back some 10-12 years. Over this time there would have been hundreds of papers published on ants and spiders, and new insecticide products and formulations emerged onto the market. In the end, the pest technician wants to know what is *available now* for the management of the species they are tasked to control. Not only do they need to know what is currently available, even more importantly, they need to understand the limitations of the tool they are going to use. An e-book would mean that photographs could be clickable to reveal larger images that would make inspection of key taxonomic features easier to see. Moreover, text books are carbon wasteful, and as the negative impacts of climate change become increasingly apparent, we need to consider the impact of such products on the world and our future generations.

It is time we need a rethink about pest management books; a hard copy is fixed in time and not a living document. There needs to be a move to a subscription based service for such texts, which are reviewed every year and thus have ongoing relevance.

Having said that, much of the information in both books is not going to change dramatically over time and both texts are extremely comprehensive, superbly produced, and would be worthy additions to your library. I can only hope that both texts will be available electronically in the not too far distant future.

About the Authors: Stoy A. Hedges is the senior author on both books (and sole author on the ant tome). He is an entomologist that graduated from Purdue University and later joined Terminix as the Manager for Technical Services. He has produced more than 150 articles for Pest Control Technology and served as Editorial Director for a number of editions of the *Mallis Handbook of Pest Control*, the premier pest management text in the US. Richard S. Vetter was co-author on the spider book and worked at the University of California, publishing more than 100 spider related papers. Thus the biography of both authors is impeccable (as well as being *very* impressive) and therefore readers can have assurance that the information included is accurate at the time of publication.

Field Guide for the Management of Urban Spiders (2nd Edition) was released in 2012 and retails for USD$12.95. *Field Guide of the Management of Structure-Infesting Ants* (3rd Edition) was released in 2010 and retails for USD$9.95. Both are available from the PCT book store: https://store.pctonline.com/en/pct-books

Special offer to FAOPMA Magazine readers; use the coupon code **FAOPMA** to **receive 20% off the order of any of the PCT Field Guides**.

Thank you to Brad Harbison from PCT for providing the two guides. ■

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Social Distancing tips from Australia

FAOPMA Member News

The latest in happenings and events from the Associations in our region

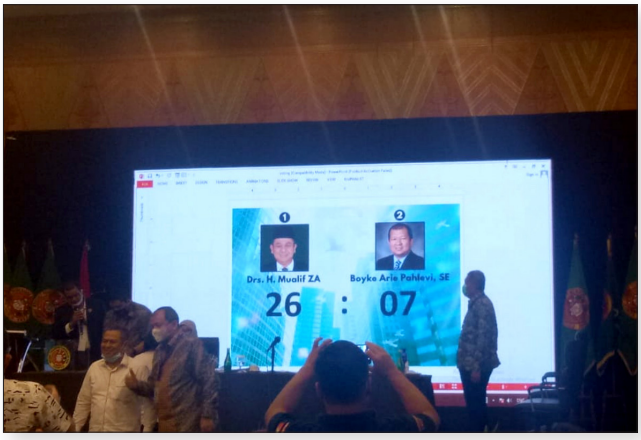
Please send your report to Stephen L. Doggett or David Lilly

INDONESIA

On Thursday, 10 September 2020, the Indonesia Pest Control Association (Aspphami) National Assembly was held at Horison Ultima Hotel Bekasi West Java and opened by Mr. Syahrul Yasin Limpo, Minister of Agriculture of the Republic of Indonesia (Picture 1 and Picture 2). On the Agenda was the 2020-2025 President election. Mr. Boyke Arie Pahlevi as the incumbent, alongside Mr. Muallif Zainal Asikin as candidate.

Result: Mr. Muallif Zainal Asikin has been elected as the new IPCA President with 26 votes over 7, from total 33 entitled votes (Picture 3 and Picture 4). The elected president Mr. Muallif Zainal Asikin takes a photo with his supporters (Picture 5).

Then two months later, on Tuesday, November 10, 2020, the 2020-2025 IPCA Executive Committee Members was successfully inaugurated by the Chairman of Indonesian Chamber of Commerce, which was represented by Mr. Suharyo Husen,



Head of Food Security Department (Picture 6 and Picture 7). Also in attendance, Dr A.M. Adnan MP, Director of Biosecurity and Plant Quarantine Center, Ministry of Agriculture of the Republic of Indonesia; representative from Indonesian Cleaning Service association and representative from Indonesian Construction Service Association. The inauguration ceremony was continued with the submission of the association flag by the

advisory board to the new President (Picture 8).

There were 24 inducted executive committee members, including Mr. Muallif Zainal Asikin as the President. In the welcoming speech, Mr. Muallif Zainal Asikin expressed his support for FAOPMA-Pest Summit 2020 and encouraged all Aspphami members to join by becoming participants (Picture 9). The President has also stated that Indonesia is all set to host FAOPMA-Pest Summit 2026. The inauguration was held at Persada Executive Club, in Halim Perdanakusumah, Jakarta. ■

Report provided by Mr Drajat Nugraha.

PAKISTAN

THE IMPACT OF COVID-19 UPON THE PEST MANAGEMENT INDUSTRY IN PAKISTAN

Ashraf Sattar Adamjee

INTRODUCTION

The COVID-19 pandemic has shocked the whole world. The disruption of routine life with the rise in death toll created a very unfriendly environment with everyday bringing in unprecedented challenges. The COVID-19 surfaced in mid of February, somewhat late in Pakistan.

The government immediately issued SOP's and implemented the lock-down that brought the

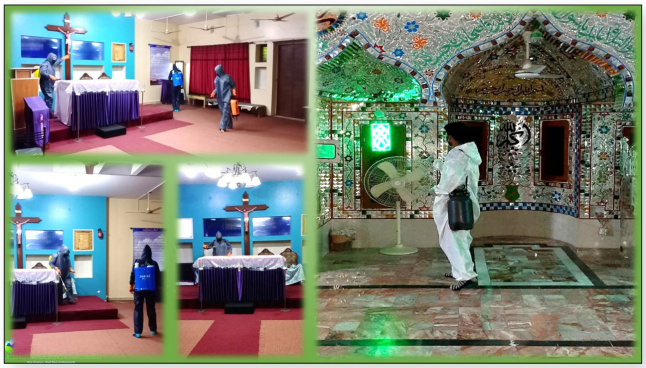
life to a standstill all over the country. Pakistan being a developing country with a population of 220 million, where the majority of the people rely on daily wages, the COVID-19 pandemic came as nothing less than a curse.

With the closure of offices, factories, and all the domestic and commercial activities, the blow was equally felt by the Pest Control Industry of Pakistan.

PPMA EFFORTS

In these desperate times, the PPMA management joined their heads together to look for possible solutions to fight the menace of the pandemic and serve the nation. The only viable option was to come forward and carryout disinfection services of public areas. This was not an easy task as it was a life threatening situation that demanded exceptional courage from the Pest Control Operators.

The PPMA Members agreed in principal to undertake the said task, without fearing for their lives. The operation commenced as planned by conducting the COVID-19 campaign day and night all over Pakistan covering places of worship belonging to different religions, hospitals, clinics,



police stations, law enforcing units and their transports, etc.

This operation resulted in creating a very special place for PPMA in the hearts of general public and the local government. A time came when the PPMA staff and their vehicles on move were hailed by the local population. Local media praised the efforts of PPMA as they praised the para medical staff. Later, the Prime Minister of Pakistan introduced Smart Lock Down, which was appreciated and implemented elsewhere.

This resulted in opening of a window of opportunity for business activities. During the peak of the pandemic, looking at the quantum of disinfection viz-a-viz the resources available with the Government of Pakistan, the PPMA exercised their good initiative and attended the inquiries of the business community, providing relief and comfort to the masses. Just to mention here that only two PPMA member companies alone treated 40,000 + Hospitals and Clinics etc. as one project all over Pakistan.

With the blessing of God Almighty, Pakistan has been amongst the few countries where the Corona virus has been eliminated almost 90%. We

are relatively at peace now. As the situation has improved, life is thus returning to normal [Editors: as of mid-November 2020, a second virus wave has occurred in Pakistan, albeit not as intense as the initial activity, although it has been more prolonged than the initial wave].

The COVID-19 services are either discontinued or their services frequencies are reduced. Though there is reduction in Corona virus related business for the pest control industry, the regular business has also geared up and business has moved towards its normal standard.

CONCLUSION

While the COVID-19 pandemic was a curse

for the whole world, it has taught us many lessons as a community in general and for the pest management industry in particular. The lockdowns demanded patience and restraint from the communities, the death toll demanded courage and initiative from the pest controllers as the front line soldiers. Altogether, an outstanding example has been the sacrifices made by individuals for the human mankind, without prejudice, without cast and colour. The COVID-19 has asserted that the chances of success are greater when there is good team work. ■

This article is a summary of Mr Adamjee's presentation at the FAOPMA-Pest Summit 2020 Virtual 2020.

Mr. Ashraf Sattar Adamjee is President of the Pakistan Pest Management Association (PPMA).

PHILIPPINES

THE IMPACT OF COVID-19 ON THE PEST MANAGEMENT INDUSTRY IN THE PHILIPPINES

Danilo L. Magpantay

In a study published on 14 September, 2020, The Lancet, a leading international medical journal, ranked the Philippines 66th out of 91 countries in suppressing COVID-19. At present, COVID-19 infection is still one of the highest across Southeast Asia.

With over eight months of lockdown, among the most affected are tourism and service industries

covering the pest management sector, and more establishments are susceptible of closure.

Sustainability of funds for public finances and services is affected with the drop in taxes and budgetary income.

Impact on the Industry

The impact on the pest management sector will have long lasting effects, which should be taken seriously:

- Priority spending due to economic slowdown leads to lower demands on pest control services.
- A profit loss is expected because of short term contracts.
- Perimeter treatment is highly favored by clients.
- Lack of public transport results to low productivity.
- Low sales transactions and maintaining existing clients are primary issues that need addressing.

- Required swab testing is an added financial burden to business owners. Furthermore, treatment for COVID-19 is expensive.

Challenges Facing the Industry

Having limited operation and less income, then we have to find ways to increase our revenues by:

- Embracing new trends on hygiene management technologies aside from the usual pest control work, and focusing on other disease vectors amidst the pandemic.
- Reducing unnecessary cost and unproductive business undertakings, among many others business modifications.
- Focusing demands on health care and food manufacturing facilities to protect stored products against pests due to shortage of supplies affecting global market.

Business Initiatives under the New Normal

Investing in digital technology by transforming the business environment is highly conducive to the current demands.

Industry associations are now hosting virtual trainings against COVID-19 being sponsored by our chemical suppliers.

Around 75% of our members are now conducting COVID-19 disinfection services and more are joining as front liners against the virus.

Finally, the need to reopen the economy and prevent the spread of virus by having a good understanding of COVID-19 through virtual conferences like this is highly essential, and everyone must act with more responsibility in simply keeping social distancing, wearing masks and observing basic hygiene combined with all efforts of the government and the global community to stop COVID-19. ■

This article is a summary of Mr Magpantay's presentation at the FAOPMA-Pest Summit 2020 Virtual Conference.

Danilo L. Magpantay is President of the The United Pest Management Association of the Philippines (TUPMAPHILS).

TAIWAN

THE IMPACT OF COVID-19 ON THE PEST MANAGEMENT INDUSTRY IN TAIWAN

Hsiu-Hua Pai

Taiwan currently has (as of 28/Oct/2020) 550 confirmed cases of COVID-19 and 7 deaths, which is 458 from abroad and 55 from local transmission. There have been no local cases for 180 consecutive days in Taiwan, which shows that our government had controlled this virus well.

One of the key factors for the success of this epidemic prevention was thanks to the experience of SARS in 2003. SARS coronavirus (SARS-CoV) – virus was identified in 2003. SARS-CoV is thought to be an animal virus from an as-yet-uncertain animal reservoir, perhaps bats, that spread to other animals (civet cats) and first infected humans in the Guangdong province of southern China in 2002. Transmission of SARS-CoV is primarily from person to person. It appears to have occurred mainly during the second week of illness, which corresponds to the peak of virus excretion in respiratory secretions and stools, and when cases with severe disease start to deteriorate clinically. Most cases of human-to-human transmission occurred in the health care setting, in the absence of adequate infection control precautions. Implementation of appropriate infection control practices brought the global outbreak to an end. Transmission in

Taiwan stopped by quarantine and international cooperation, including formulating hospital standard operating procedures, using medical techniques to quickly detect, isolate and treat patients, environmental disinfection and people's epidemic prevention education, due to the cooperation of the people, and adjusting the prevention strategies with the epidemic. Therefore, the COVID-19 outbreak in Taiwan has been well controlled in the beginning.

At the beginning of the epidemic, the Environmental Protection Administration, Executive Yuan, compiled guidelines for the disinfection of the COVID-19 community epidemic prevention public environment disinfection guidelines, and recommended the internal public environment disinfection and epidemic prevention measures, public space in community places should be kept clean at all times. Disinfection focus includes: community doors, ladder halls, elevators, stairs, gyms, reading rooms and multi-functional activity space and other public areas door handles, handrails, washrooms, megaphone knobs, and all kinds of air-conditioning. Other public units (e.g. campuses, parks, public toilets, etc.) include the park's activities and public toilets, and staff will often come into contact with the surface (such as the ground, tables and chairs, telephones and other surfaces of frequent contact, as well as toilet surfaces such as faucets, toilet doorknobs, toilet covers and flush grips), and they need disinfection' the frequency is to be at least once a day.

Many pest control services were curtailed during the COVID-19 crisis due to lockdown restrictions and business closures. It is believed that this along with the lower numbers of people on the streets in recent months as well as a reduction in food waste from restaurants has encouraged more rats to come into the open in search of food. As a result, more homes and businesses will require pest control services to deal with infestations. On the other side, at the beginning of the epidemic, the demand for disinfection equipment and other equipment like protective clothing has increased, and the demand for disinfection has increased by 30%. As a result of the sudden surge in disinfection demand, PCO manpower demand increased, and PCO protection materials demand also increased.

Pest control operators are worried about their health and safety when the execution of the business is exposed to a dangerous situation. Fortunately, in response to demand, with the increase training of PCOs with sufficient prevention and treatment materials, and the cooperation of the people to prevent the epidemic, all the epidemic prevention work can be carried out smoothly.

The COVID-19 outbreak in Taiwan was well controlled at the beginning. So, travel, commercial business, and daily life on the island remain normal now, and no schools closed due to COVID-19. Most people became used to wearing face masks, washing hands frequently, and keeping up a social distance in public spaces. The income of PCOs increased by 30% compared over the same period compared with the previous year. Overall, due to the COVID-19 epidemic, the increase in environmental hygiene requirements have also increased the performance of the PCO. For pest control companies, the COVID-19 pandemic has certainly had an impact on the way that business is conducted. While most municipalities have deemed pest control to be an essential service, businesses still need to modify their business practices in order to remain efficient, profitable, and productive in the wake of the pandemic and to move forward. ■

This article is a summary of Prof Pai's presentation at the FAOPMA-Pest Summit 2020 Virtual Conference.

Prof. Hsiu-Hua Pai is the Professor from the Department of Kinesiology, Health, and Leisure Studies, National University of Kaohsiung, Taiwan, and President of Taiwan Environmental Pest Management Association.

THAILAND

THE IMPACT OF COVID-19 ON THE PEST MANAGEMENT INDUSTRY IN THAILAND

Supanut Kiatyingpracha

COVID-19 hit Thailand in early 2020. Government action stemmed infections, but the impact on the economy and society in 2020, and beyond, will be large.

Timeline: Covid-19 in Thailand

January 2020

- 3 Jan, Activation of The Department of Disease Control's Emergency Operations Centre and Incident Command System.
- 31 Jan, first local transmission.

March 2020

- 13 Mar, two clusters of cases are detected in Bangkok.
- 17 Mar, Thailand closes high risk places & business.
- 24 Mar, Thailand declares state of emergency.

April 2020

- 2 Apr, a curfew is implemented in Thailand and people are banned from leaving their home 10pm to 4am nationwide.
- 2 Apr, Thailand suspends incoming flights.

May 2020

- 3 May, first phase of easing lockdown restrictions.
- 17 May, second phase of easing lockdown restrictions.

Impact of COVID-19 on the Thai economy

Thailand's economy is expected to be impacted severely by the COVID-19 pandemic, shrinking by at least five percent in 2020 and taking more than two years to return to pre-COVID-19 GDP output levels, according to the World Bank's latest Thailand Economic Monitor, released today (17/Nov/2020). The COVID-19 pandemic shocked the economy especially in the second quarter of 2020 and has led already to widespread job losses, affecting middle-class households and the poor alike.

While Thailand has been successful in stemming the tide of COVID-19 infections over the last three months, the economic impact has been severe.

The tourism sector, which makes up close to 15 percent of Thailand's GDP, has been hit hard, with a near cessation of international tourist arrivals since March 2020.

Exports are expected to decline by 6.3 percent in 2020, the sharpest quarterly contraction in five years, as demand for Thai goods abroad remains weakened by the global slowdown. Household consumption is projected to decline by 3.2 percent as movement restrictions and dwindling incomes limit consumer spending, especially in the second quarter of 2020.

An estimated 8.3 million workers will lose employment or income by the COVID-19 crisis, which has put many jobs, in particularly those related to tourism and services, at risk. The report finds that the number of economically insecure, or those living below USD$5.50 per day (in purchasing power terms), is projected to double from 4.7 million people in the first quarter to 9.7 million people in the second quarter of 2020. In particular, the share of economically insecure middle-class households with workers in the manufacturing and services sector will rise by three-fold, from 6 percent to 20 percent (Source: World Bank).

Thailand Government and Institution Measures in Response to COVID-19

Liquidity boosting for labor in affected industries:

- Cash support of THB 5,000 for 3 months starting Apr to Jun 2020 for labor, temporary workers, and freelance not registered under Social Security System (SSS). Individuals under SSS will received 50% of previous salary (but not exceeding the maximum salary of THB 15,000 per month) if the employer temporary halt employment.
- Cash support of THB 5,000 for 3 months starting May to July 2020 for farmers.
- Special loan of 10,000 per person, 0.1% interest rate, no collaterals needed.
- Special loan of 50,000 per person, 0.35% interest rate, collaterals required.
- Loans to government pawn shops to further boost liquidity for lower income citizens.
- Grace period provided for principal payments

and consideration for reduction in interest per customer for personal loans, hire purchase and leasing loans, house loans, Small and Medium Enterprise loans, microfinance, and nano-finance. The details of relief measures and conditions vary depending on each bank/ non-bank (Source: KPMG).

Impact of COVID 19 on Thailand's Pest Control Businesses

Six months after WHO declared COVID-19 a global pandemic, a survey of the pest management industry indicated the following findings:

Finances and business:

- Slightly affected,
- We are experiencing slow payment collection from customers,
- We are implementing an operational cost-reduction strategy to our business.

PCO business been affected by the COVID-19 pandemic in the last 6 months:

- Customers in corporate market: 16-30%,
- Customers in domestic household market: below 15%.

Changes in workforce and employees:

- Heightening health-and-safety practices of employees,
- Labor shortages in PCO business.

Thailand Pest Management Association (TPMA) Support Members & Social Responsibilities:

Support: In response to the pandemic and isolation measures put in place in most countries, TPMA are offering free online training for all member for two times:

- Dengue: virus, fever and mosquitoes
- How to keep insects away from house.

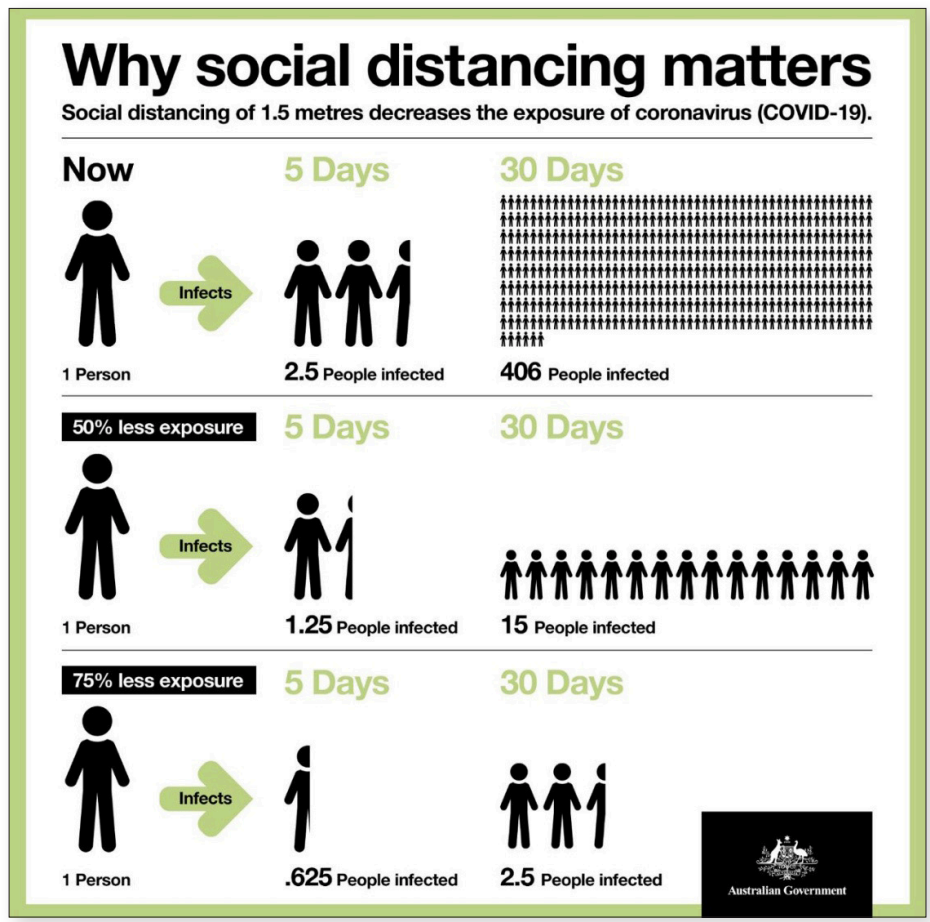
Social Responsibility: TPMA donated money to hospital and public health agencies for fighting COVID-19 pandemic an amount of 1,000,000 baht (USD$33,000).

Summary

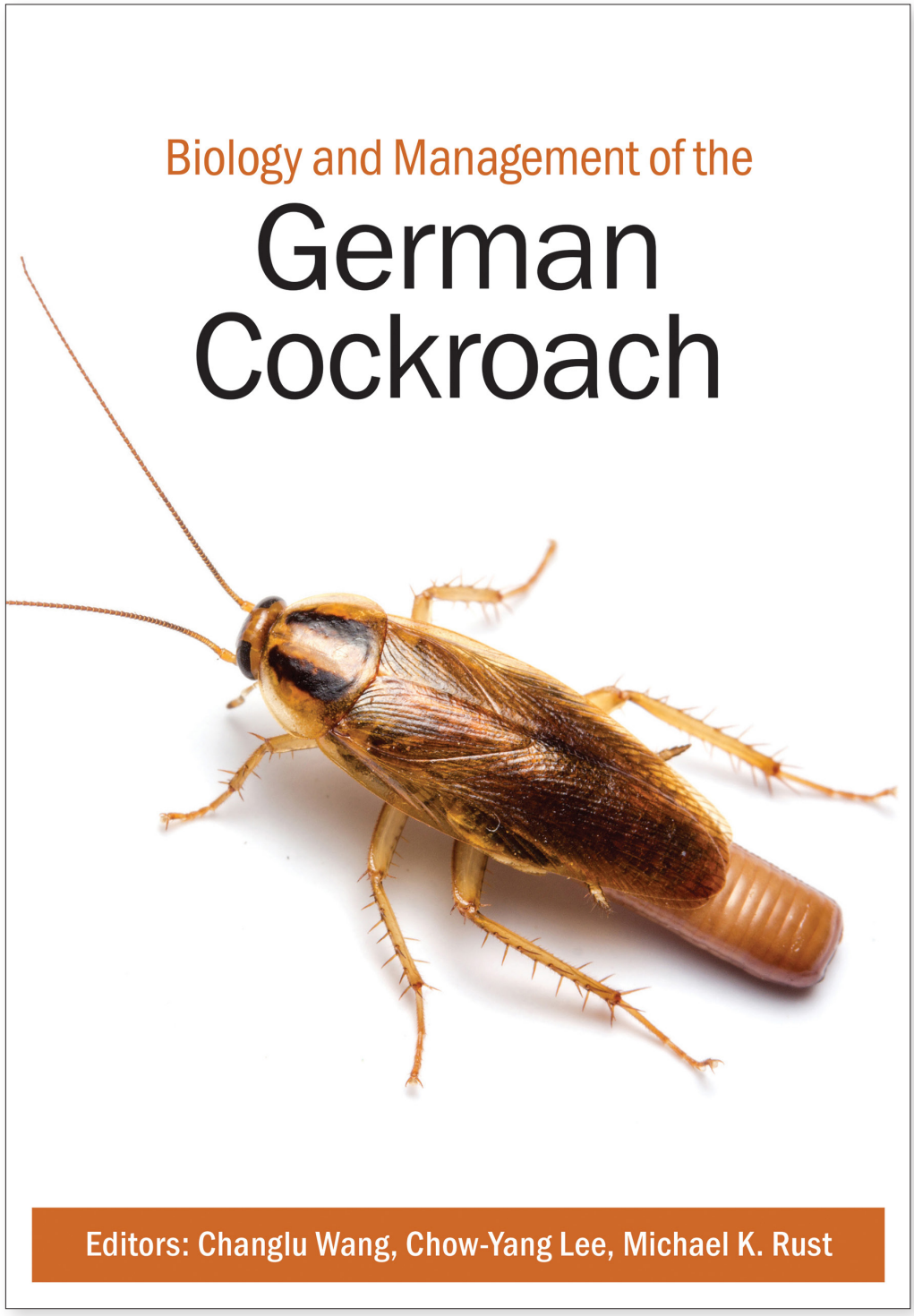
Pest control is necessary during COVID-19 pandemic in both residential and commercial settings, especially when it comes to food, as cockroaches, rodents and insects transmit diseases to you and your pets. Pest control still important to keep the community safe and healthy. ■

This article is a summary of Mr Kiatyingpracha's presentation at the FAOPMA-Pest Summit Virtual 2020 Conference.

Supanut Kiatyingpracha is President of the Thailand Pest Management Association (TPMA).



Coming in May 2021!



MORE DETAILS IN THE APRIL ISSUE OF THE FAOPMA MAGAZINE

News Items

A Compendium of Pest Management News Items from the Media Relevant to FAOPMA Member Countries

Compiled by Stephen L. Doggett and David Lilly

AUSTRALIA: BECOMING VEGETARIAN FROM A TICK BITE

The bite from several species of tick around the world can lead to a condition known as "Mammalian Meat Allergy". In the process of the bite, the tick transmits a carbohydrate molecule known as 'alpha-gal' and developing antibodies to this compound can mean you can develop a sensitivity to consuming meats of mammal origin. Symptoms occurs several hours after the meal and may include bloating, pain, rashes, hives, and even a life-threatening anaphylaxis. The story below recounts how a patient developed the disease after receiving a bite from the Australian paralysis tick, *Ixodes holocyclus*. For more information on the condition and how best to safely remove attached ticks, go to www.tiara.org.au.

Source: *ABC* (26/Dec/2020), www.abc.net.au/news/2020-12-26/i-cant-eat-red-meat-tick-bite-not-vegan-or-vegetarian/12827118

NEW ZEALAND: NATIONAL MOSQUITO CENSUS

Te Papa is the leading museum in New Zealand and one aim of theirs is to document the occurrence of wildlife across the country – this even extends to mosquitoes. Entomologist, Dr Julia Kasper is asking people to collect mosquitoes and send them to the museum. This will help to document the presence of both native and introduced species across the country. More details can be found on the Te Papa museum web site: www.tepapa.govt.nz/discover-collections/read-watch-play/science/new-zealand-mosquito-census.

Source: 1News (26/Dec/2020), https://www.tvnz.co.nz/one-news/new-zealand/te-papa-calling-kiwis-collect-mosquitoes-national-census

ASIA: AMAZING VIDEO OF PARALLEL ANT AND TERMITE TRAIL

An extraordinary video has been captured that shows an ant and termite trail running in parallel, with a column of soldier termites lined up between the two trails protecting the termites. This is well worth a watch.

Source: *Twitter* (22/Dec/2020), https://twitter.com/SteveStuWill/status/1341189299878854656

CHINA: CUSTOMS SEIZE ANTS FOR THE PET TRADE

Chinese customs have seized a number of ants destined for the pet trade that originated from Australia. According to the report, the ants were poisonous ('venomous' is the correct term). The shipment contained *Myrmecia* ants that can inflict a painful sting and may cause death from anaphylaxis. Other ants included carpenter ants from the genus *Camponotus*, which is a stingless variety. Both are large species and popular with ant collectors. The ants were destroyed as authorities are worried about the importation of

possible diseases.

Source: *XinhuaNet* (21/Dec/2020), http://www.xinhuanet.com/english/2020-12/21/c_139607448.htm

SINGAPORE: LOWEST WEEKLY DENGUE TOTAL FOR THE YEAR

In Singapore, the year of 2020 will not only be remembered for the COVID-19 pandemic for it was also biggest year for dengue activity in the history of the island nation. As of mid-December there had been some 34,844 dengue cases. For the week ending 12/Dec case numbers have dropped to 228, the lowest for the year. In spite of this low figure, the National Environmental Agency is urging residents to remain vigilant in eradicating mosquito breeding sites.

Source: *CAN* (18/Dec/2020), www.channelnewsasia.com/news/singapore/dengue-cases-singapore-lowest-weekly-count-2020-nea-13799726

MALAYSIA: WHO WANTS COCKROACHES IN YOUR CAKE? HOW ABOUT ON IT!

Arguably the perfect cake for a young and upcoming pest manager would be one that features one of their favourite pests…but cockroaches??? The Slice Ipoh Homebaker in Perak, Malaysia, has produced a delicious cake covered in what appears to be American cockroaches. One of the roaches even appears to be burrowing out of the top of the cake. Delicious!

Source: *Mothership* (15/Dec/2020), https://mothership.sg/2020/12/lizard-cockroach-cakes/

INDIA: RODENTS CAUSE ROAD COLLAPSE

In Ludhiana, in northern India, rodents had dug under a road in a garbage dump, causing the road to collapse. The problem was that the garbage dump was located directly under an elevated road. The rodents had dug into the soil under the road, leading to its collapse. Unfortunately such garbage dumps are common and there is rarely any rodent control undertaken, threatening the stability of other roads in the region.

Source: *The Times of India* (13/Dec/2020), https://timesofindia.indiatimes.com/city/ludhiana/road-near-garbage-dump-caves-in-after-rodents-eat-into-base/articleshow/79699269.cms

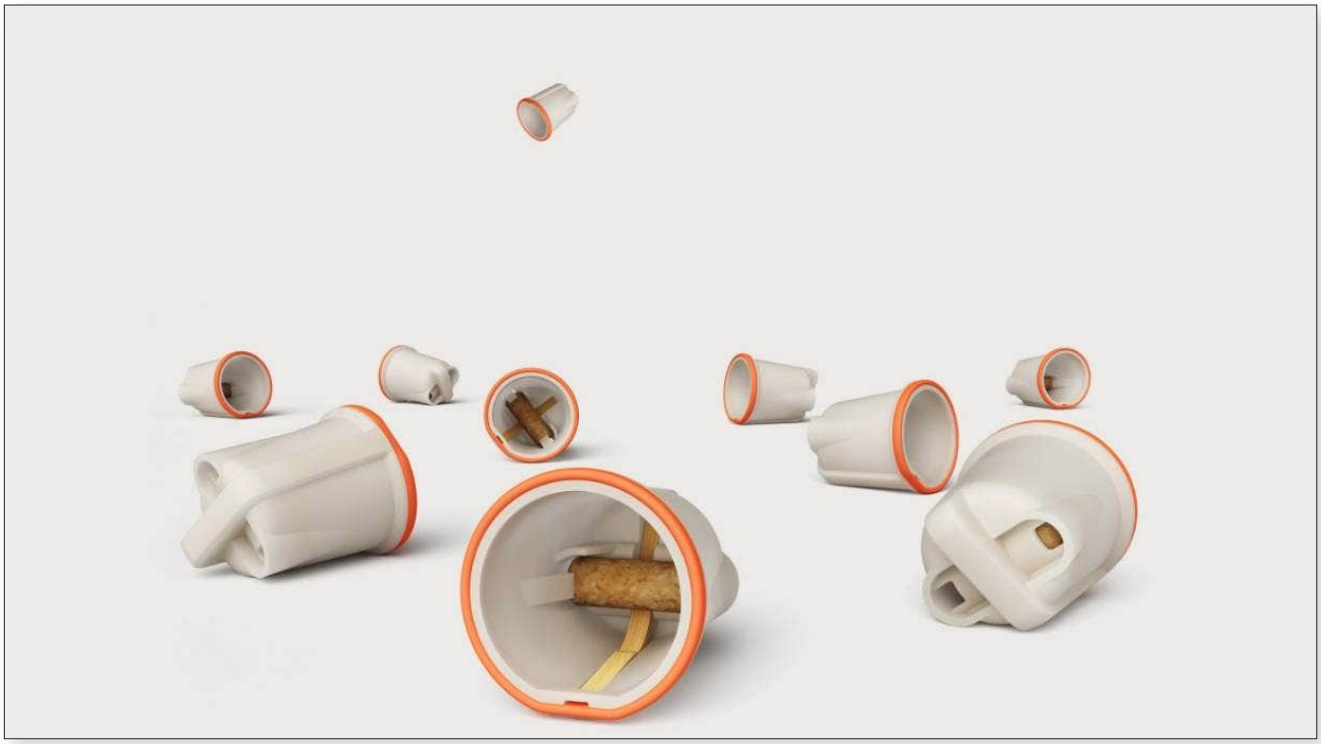
NEW ZEALAND: BIODEGRADABLE RAT TRAPS

With the aim of New Zealand trying to eliminate feral animals by 2050, the company Goodnature has come up with a novel method of rodent control. They are developing small biodegradable rodent traps that can be dropped via drones to remove locations (see image next page). Each trap is roughly the size of a coffee capsule and contains a bait. When the rodent chews on the bait, an elastic band snaps around its neck, quickly strangling the creature. The trap is single use and all components are biodegradable and there are no toxins involved. Being able to be delivered by drones means that they can be dropped into remote inaccessible locations. At this stage, the product is in development and the company has received NZD$1.3million (USD$0.92million) to make the concept into a reality.

Source: *Stuff* (10/Dec/2020), www.stuff.co.nz/environment/123631385/tiny-biodegradable-rat-traps-can-be-dropped-by-drone-and-leave-no-trace

USA: FURTHER BANS ON RODENTICIDES

With so many reports of secondary poisoning in wildlife, the California Governor signed a law that prohibits the use of second-generation anticoagulant rodenticides (SAGRs). Only licenced pest managers will be permitted to use these



The Goodnature biodegradeable rat traps that can be dropped into remote areas via drone. See story previous page.

products. Recent surveys have found more than 75 percent of wildlife being positive to the SAGRs, with mountain lions being 90% positive.

Source: *UCANR* (10/Dec/2020), https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=44338

SINGAPORE: FLOUR MILL FINED $3,000 OVER PESTS

A flour mill in Singapore was fined SGD$3,000 (USD$2,200) after failing to keep its premise free of cockroaches and rodents. Dawood Flour Mill premises were also noted to have poor housekeeping according to the Singapore Food Agency. The licence of the mill was suspended for 15 days, in addition to the fine.

Source: *CNA* (9/De/2020), www.channelnewsasia.com/news/singapore/dawood-flour-mill-fined-cockroach-rats-infestation-rodent-13734686

INDIA: MYSTERY DISEASE POSSIBLY DUE TO MOSQUITO FOGGING

In Eluru town of Andhra Pradesh in India, one person has died while 450 have reported symptoms of unconsciousness and fainting. Other symptoms include epilepsy, forgetfulness, anxiety, vomiting, headache and back pain. There is a suggestion that the cause is chemical poisoning, but questions remain as to how many people could be exposed to such a chemical over a moderately wide area. It has been suggested that the chemical could be an organochloride insecticide used in foggers for adult mosquito control. Laboratory tests are still pending and until the final tests are completed, the local health department is refusing to speculate on the cause, which has resulted in more than 250 people being hospitalized with the condition.

Source: *The Tribune* (8/Dec/2020), www.tribuneindia.com/news/nation/eluru-mystery-disease-may-be-caused-by-anti-mosquito-fogging-181564

PESTWEST WINS PRESTIGIOUS AWARD FOR FLYDETECT®

Flydetect® from PestWest was announced as one of the joint winners of the New Product Award at The Society of Food Hygiene and Technology Virtual Awards Ceremony which took place on Friday 4th December 2020. These awards recognises innovations and excellence in the

food industry. Flydetect® is a remote monitoring fly solution that incorporates a camera within the unit that sends real time alerts to the user. This can then provide the prompt for when fly management is required within a facility. Clearly these devices are the way of the future and congratulations to PestWest! For more information on Flydetect®, see www.flydetect.com.

Source: *PestWest Media Release* (8/Dec/2020).

INDIA: MOSQUITOES ON THE INCREASE IN TRICHY CITY

In Tiruchirappalli, India, which is commonly known as 'Trichy City', mosquitoes are on the rise following moderate rainfall. Water has stagnated across the city, leading to mosquito breeding. A lack of stormwater drains is exacerbating the problem as water is draining to vacant blocks, creating perfect mosquito larval habitat. Normally mosquito fogging is undertaken around this time of the year, however COIVD-19 is hampering mosquito control efforts.

Source: *The Times of India* (8/Dec/2020), https://timesofindia.indiatimes.com/city/trichy/mosquito-menace-on-the-rise-in-trichy-city/articleshow/79614756.cms

FIJI: CALLS FOR TERMITE TASK FORCE

Following the introduction of the Asian Subterranean Termite, calls have gone out to establish a taskforce to address this termite species. The Minister for Agriculture, Mr Mahendra Reddy is claiming that little has been done to protect the agricultural sector from this termite and has suggested that better cooperation between government and university is needed. He has called for a task force to be formed between the Ministry of Agriculture and the Fiji National University.

Source: *The Fiji Times* (6/Dec/2020), www.fijitimes.com/call-to-establish-joint-taskforce-to-address-termite-problems/

BORNEO: EXPLODING ANTS!

An ant that lives in the tree tops of Borneo literally explodes in defence of the colony. The species, *Colobopsis explodens*, commonly called the 'exploding ant', exhibits a behaviour called 'autothysis', which literally means 'self-sacrifice'. The ant's abdomen is full of a sticky yellow poison and when threatened, they squeeze their internal organs to the point where the abdomen ruptures, spraying the predator.

Source: *SBNation* (3/Dec/2020), www.sbnation.com/secret-base/22083664/exploding-ants-colobopsis-explodens-nature-is-cool

SINGAPORE: DRINK SHOP SUSPENDED OVER COCKROACHES

The drink outlet Tuk Tuk Cha in NEX shopping centre has been suspended for two weeks by the Singapore Food Agency for accumulating demerit points over failing to keep their premise free of cockroaches. All food handlers in the premise are required to successfully complete a basic food hygiene course before they return to work.

Source: *Mothership* (2/Dec/2020), https://mothership.sg/2020/12/tuk-tuk-cha-nex-suspended/

INDIA: RAINS FLUSH AWAY MOSQUITO LARVAE

A cyclone in the Chennai region has not only flushed out garbage and sewage from the local river systems, it has also washed away mosquito larvae. Now the local government is stating that the risk of dengue virus has substantially been reduced as traditionally dengue case drop with the start of the monsoons. It now appears that Chennai will have one of the lowest dengue cases for some time.

Source: *The Times of India* (1/Dec/2020), https://timesofindia.indiatimes.com/city/chennai/rain-flushed-out-dengue-mosquito-larvae-says-gcc/articleshow/79499467.cms

MALARIA CASES DOWN BY 43% IN WESTERN PACIFIC

According to the World Health Organization, there has been a dramatic decline in malaria cases across the Western Pacific, including the Philippines since the year 2000. It is estimated that cases are down 43% to 1.7 million in 2019, and deaths are down from five to two cases per 1,000 population. Papua New Guinea still accounts for the majority of malaria in the region, with around 80% of all cases.

Source: *BusinessWorld* (30/Nov/2020), www.bworldonline.com/malaria-cases-in-west-pacific-down-by-43-since-2000-who-says/

INDIA: DANGERS FROM ILLEGALLY PRODUCED MOSQUITO REPELLENT STICKS

In India, incense sticks are being produced that are claimed to repel mosquitoes. Currently, many are being produced without the required government approval. Unfortunately these are often laced with pesticides and other chemicals and pose a health risk when burnt, especially to children and the elderly. Sadly people look for cheap solutions to prevent mosquitoes and often buy these products not knowing the risk. Authorities are urging people to only buy government sanctioned repellents.

Source: *Yahoo News* (28/Nov/2020), https://in.news.yahoo.com/illegal-mosquito-repellent-incense-sticks-165532854.html

SINGAPORE: COCKROACHES IN MULTIPLE ROOMS OF FIVE STAR HOTEL

A Korean women upon recently arriving in Singapore was assigned to spend her two week COVID-19 quarantine period in the five star Grand Copethorne Waterfront hotel, located on the banks of the Singapore River. Unfortunately the first room assigned to her had cockroaches. Upon complaining, she was moved to another room that was infested with cockroaches. So was the third room, also the fourth, and finally the fifth room she was moved to had cockroaches, albeit dead. It was explained to her that due to the sudden lock down, the hotel did not have enough time to carry out a pest service. To add insult to injury, the women had to pay SGD$2,000.

Source: *Mothership* (28/Nov/2020), https://mothership.sg/2020/11/cockroaches-grand-copthorne-waterfront-hotel/

AUSTRALIA: EXPERTS WARN THAT THE RISK OD MOSQUITO-BORNE DISEASES HIGHEST FOR 10 YEARS

Eastern Australia is in the start of a La Nińa year. This is a meteorological condition that occurs across the Pacific Ocean; when one side is dry, the other side is wet, and vice-a-versa. A La Nińa is associated with increased rainfall in eastern Australia, and the last time such an episode occurred (2011) there was widespread mosquito-borne disease activity from Ross River virus. You can hear the Chief Editor of this magazine discussing this on a recent TV segment (https://7news.com.au/the-morning-show/australians-warned-to-brace-for-potentially-deadly-horror-mosquitoesseason-c-1566211). Already Ross River virus has been detected in parts of eastern Australia (https://7news.com.au/lifestyle/health-wellbeing/ross-river-virus-detected-in-mosquitoes-in-the-gippsland-area-in-vic-c-1659729). The public is being warned to ensure that they undertake mosquito bite avoidance behaviours.

Source: *ABC News* (27/Nov/2020), www.abc.net.au/news/2020-11-27/mosquito-borne-disease-transmission-threat-worst-in-a-decade/12925312

AUSTRALIA: INVASIVE KEYHOLE WASP THREATENS AIR SAFETY

A small wasp, *Pachodynerus nasidens*, has recently invaded Australia from its native lands of Central/South America. Normally it nests in plants and the ground, but will nest in artificial nooks and crannies as well. Unfortunately one of these turns out to be an important part of aircraft called the pitot probe. These are involved in calculating air speed and when they are blocked by nesting wasps, faults with the aircraft are alerted to the pilot. In Brisbane Airport in Queensland, a number of planes were forced to return to the airport of take of abandoned due to faults being reported to the cockpit as a result of the wasps blocking the pitot probe. Most of the planes affected have been A330s. The solution has been to put up fake nesting sites around the airport and once a nest is blocked, it is taken away, destroyed and replaced with a fresh nest. This has helped to reduce wasp populations around the airport.

Source: *ABC News* (27/Nov/2020), www.abc.net.au/news/science/2020-11-26/keyhole-wasp-nest-pitot-probes-brisbane-airport-aviation-safety/12919668

AUSTRALIA: CORRECT ADVICE ON TICK REMOVAL URGED

The Australian paralysis tick, *Ixodes holocyclus*, is arguably the most deadly tick in the world. While it rarely transmits pathogens, its bite can induce a lethal paralysis in both humans and pets, and allergic reactions can be very severe, with even death ensuing. The bite from the tick can also result in a sensitivity developing such

that an allergy to eating mammalian derived meats can occur. Recent research has shown that killing the tick while still attached using either permethrin cream or by freezing with an ether based spray, used for wart treatment, can reduce the risk of allergic reactions occurring. Now there is an active attempt to reduce misinformation on this tick and to encourage people to better manage tick bite. Hear the Chief Editor of this magazine, Stephen Doggett, talking about ticks on a recent TV interview with colleague, A/Prof. Sheryl van Nunen who was the first to describe the condition known as 'Mammalian Meat Allergy' (https://7news.com.au/the-morning-show/story-info/experts-explain-what-a-tick-is-and-how-to-safely-remove-them-from-your-body-c-1616793). Note you may need a VPN to view this outside of Australia.

Source: *AAP* (25/Nov/2020), www.aap.com.au/soap-and-cotton-ball-tick-removal-advice-gets-a-big-cross/

JAPAN: NEW COCKROACH SPECIES DISCOVERED

A team of Japanese scientists from Hosei University have discovered two new cockroach species from southern Japan. The cockroaches belong to the genus *Eucorydia* and were found in forests of the Nansei island chain. Both cockroaches are reported to have "an incredibly beautiful blue metallic lustre, with vibrant orange markings that create a band across their abdomen." They are not known to invade homes. See pictures of these new species in the link below.

Source: *SoraNews24* (25/Nov/2020), https://soranews24.com/2020/11/26/first-new-japanese-cockroach-species-in-35-years-discovered-by-scientists%E3%80%90photos%E3%80%91/

INDIA: WOMEN DIES WHILE TRYING TO KILL ANTS

An Indian women from Chennai attempted to eliminate an ants with the use of kerosene. She placed a paper soaked in the accelerant onto the nest, and when her mother lit the paper, then ants started running over the first women's legs. Unfortunately she was still holding the can of kerosene, which spilled all over her and all of sudden was engulfed in flames. Employing a pest manager would have been safer!

Source: *The New Indian Express* (23/Nov/2020), www.newindianexpress.com/cities/chennai/2020/nov/23/attempt-to-kill-ants-turns-fatal-for-this-chennai-woman-2226788.html

PHILIPPINES: REWARDS INCREASED FOR RAT CATCHERS

In the Philippines, rats cause millions of damage to crops every year. Thus the government introduced a "Cash for Rats" program whereby people are paid P5 (USD0.10) for each rat tail delivered to the authorities. So far almost 156,000 rat tails have been paid out equating to payments of close to P780,000 (USD$16,000). A total of P1 million has been allocated as rewards for the rat control program.

Source: *SunStar* (23/Nov/2020), www.sunstar.com.ph/article/1877801/Pampanga/Local-News/Reward-for-rat-tails-nears-P800000-mark

SINGAPORE: ANTI-MOSQUITO KITS GIVEN OUT BY NEA

With dengue cases remaining high in Singapore following this years all time record number of cases, the National Environmental Agency (NEA) is giving out anti-mosquito kits to all residential homes. The kits contain a booklet on mosquitoes, one tablet of Bti, and various stickers and fridge magnets. Residents are also encouraged to visit the NEA web site, which contains information on the current incidence of dengue and the location of dengue hot spots, and information on mosquitoes and their control (www.nea.gov.sg/dengue-zika). So far Singapore has had 33,956 cases of dengue in 2020 and had more deaths from dengue than COVID-19.

Source: *AsiaOne* (23/Nov/2020), www.asiaone.com/singapore/landed-homes-get-anti-mosquito-kits-due-more-mosquito-breeding-nea

INDIA: MOSQUITO COMPLAINS IN CHENNAI DOWN 17%

Mosquito complaints to the local government in Chennai have dropped by 17% upon last year. This has been the result of the local council's campaign to remove rubbish in waterways. This rubbish is a major source of mosquito breeding.

Source: *The Times of India* (22/Nov/2020), https://timesofindia.indiatimes.com/city/chennai/

mosquito-menace-in-chennai-17-drop-in-complaints-seen/articleshow/79347985.cms

HONG KONG: PASTA SOLD CONTAMINATED WITH RAT HAIR AND INSECTS

Dried pasta that was being sold in Hong Kong was found contaminated with rat hair, insect fragments and toxins from mould. The pasta was also found contaminated with pesticide residue. The mould toxins could cause vomiting and diarrhoea if consumed in large amounts. The company producing the pasta, Nissin, denies the insect fragments and believes the testing laboratory mistook wheat bran as insect particles.

Source: *South China Morning Post* (16/Nov/2020), https://sg.news.yahoo.com/pasta-sold-hong-kong-contains-093224465.html

NEW ZEALAND: NEW TECHNIQUES TO ELIMINATE FERAL VERTEBRATES

The project 'Predator Free New Zealand' is aiming to eliminate feral vertebrate by the year 2050 in order to protect sensitive flora and fauna. One particular damaging pest are stoats. In the Perth Valley, within the South Island, all possums have been eliminated, but low numbers of rats and stoats remain. It was recently found that a dead rat poisoned with 1080 is especially attractive to stoats, which then die through secondary poisoning by consuming the dead rats. These are placed directly in front of surveillance cameras so that the activity of the stoats can be monitored. Now bird life in the valley is growing, which is a testament to the success of the program.

Source: *RNZ* (16/Nov/2020), www.rnz.co.nz/news/national/430723/dead-rats-and-cameras-lure-last-wily-stoats-in-perth-valley

PHILIPPINES: SURFING RAT SURVIVES FLOODWATERS

Recent a rat was seen floating down a flooded Manila street following typhoon Vamco. The typhoon caused major damage and widespread flooding, leading to native animals and pesky rodents to climb on board any floating object to escape the deluge. A rat was videoed on floating piece of wood and almost appears to be surfing with the water flow; the video can be seen in the link below.

Source: *Daily Mail* (16/Nov/2020), www.dailymail.co.uk/news/article-8953337/Surfing-RAT-survives-Philippine-floods-hopping-piece-wood-riding-waters-safety.html

AUSTRALIA: RAT BURGER FOR LUNCH ANYONE?

A health worker in Toowoomba, Queensland, was unpleasantly surprised when he was served a cook rat inside his burger from the Wellbean Co café. He bit into the burger and thought that something was wrong…very wrong. You can imagine his surprise, and disgust, when he opened up the burger. A subsequent investigation found that the café was complying with all health laws and was allowed to continue to operate.

Source: *7 News* (12/Nov/2020), https://7news.com.au/lifestyle/health-wellbeing/toowoomba-hospital-cafe-wellbean-co-forced-to-apologise-after-worker-served-dead-rat-c-1568132

SINGAPORE: HOME INVADED BY HUNDREDS OF COCKROACHES

Following the treatment of a rubbish chute, hundreds of cockroaches invaded a flat in Bukit Batok. Questions were then raised on the frequency of treating the rubbish chutes as the cockroach infestation was so severe. Residents are advised to tape up and seal their rubbish chute prior to treatments.

Source: *The Independent* (12/Nov/2020), https://theindependent.sg/hundreds-of-cockroaches-allegedly-invade-bukit-batok-residents-flat-after-rubbish-chute-fumigated/

Cockroaches invade Singapore home

AN INTERVIEW WITH DINI MILLER ON APM

Prof. Dini Miller from Virginia Tech in the US, who has spoken at a number of past FAOPMA-Pest Summits is a guest speaker on Talking Pest Management (TPM). TPM was recently featured in the July 2020 issue of the FAOPMA Magazine (https://faopma.com/Resources/FMFiles/Magazines/202007/FAOPMA_Magazine_2020_July_Page46-47_Talking_Pest_Management.pdf) and features a series of interviews with notable figures in the pest management industry. Dini Miller is internationally renowned for her work on cockroaches and bed bugs, and was a co-editor on *Advances in the Biology and Management of Modern Bed Bugs*, the first comprehensive text on bed bugs for 50 years. She is in great demand on the speaking circuit globally both for her extraordinary knowledge and incredible insights, and her entertaining presentation style. In this video, Dini discusses the history of Integrated Pest Management and suggests the term should be changed to '*Assessment Pest Management*'. Listen to the video for Dini's explanation for the reasons behind the new term.

Source: Talking Pest Management (10/Nov/2020), https://youtu.be/bjk5GgrGueA

INDIA: MOSQUITO COIL CAUSES FIRE AND INJURES POLICEMEN

In Odisha, eastern India, a fire initiated by a mosquito coil led to severe burns in three policemen. A coil was lit within a barracks prior to the policemen retiring for the night, which led to their mosquito net catching alight.

Source: *Hindustan Times* (9/Nov/2020), www.hindustantimes.com/india-news/three-odisha-policemen-injured-in-fire-sparked-by-mosquito-repellent-coil/story-uTFR6QawxxW2GwihPIiFJO.html

NEW ZEALAND: CHEAP REPELLENTS OUTPERFORM MORE EXPENSIVE OPTIONS

A study undertaken by Consumer NZ involved the testing of 17 different repellent products containing various actives. The products were applied to the arms of people, which was then placed into a cage of mosquitoes for three minutes over a period of six hours. The most effective repellents included 'Bug Grr Off' and 'Bushman Plus', which retail for much cheaper than other products that performed more poorly. The less effective compounds where those that

Prof. Dini Miller speaking on 'Talking Pest Management'.

contained essential oils.

Source: *Stuff* (7/Nov/2020), www.stuff.co.nz/business/123318350/cheaper-mosquito-repellents-outperform-the-pricey-options

AUSTRALIA: INTERNATIONAL AWARD GIVE FOR MOSQUITO MAPPING PROJECT

Redlands Council in southeast Queensland recently won the prestigious 'GO SMART' award. This was given to a project aimed at developing a better mosquito monitoring system, which will lead to more targeted application of insecticide to control mosquito larvae in the region. The area has large mangrove environments that produce the saltmarsh mosquito, *Aedes vigilax*, which is a major vector of several local mosquito-borne viruses. The technology, will lead to more accurately targeted insecticide treatments and better mosquito management.

Source: *Redlands City Council News* (6/Nov/2020), https://rcc.news/2020/11/council-wins-international-award-with-mosquito-mapping-project/

USA: TERMINIX PAYOUTS $60MILLION IN LEGAL SETTLEMENT

It was alleged that the US giant pest management company, Terminix, was conducting illegal business practices in the state of Alabama. The claim is that consumers were being defrauded as the company stated that households were being treated but in fact were not. The result is that some premises suffered damage. It is then claimed that the company that charged exorbitant fees to treat the homes that subsequently had termite damage. Over 12,000 residents will have their homes retreated under the huge legal settlement. This legal settlement was the largest ever for Alabama.

Source: *Al.com* (5/Nov/2020), www.al.com/news/mobile/2020/11/alabama-reaches-historic-consumer-settlement-with-terminix.html, and *Fox10 News* (5/Nov/2020), www.fox10tv.com/news/60-million-settlement-with-terminix-over-illegal-business-practices-targeting-alabamians/article_28edeb40-1f93-11eb-bf43-f34da5ee6a1f.html

BANGLADESH: MOSQUITO CONTROL PROGRAM LAUNCHED IN CHITTAGONG

The Chittagong City Corporation has launched a mosquito control campaign in early November. Much of the mosquito problem stems from city canals that are blocked with garbage, leading to water stagnating and creating perfect mosquito breeding conditions. Unfortunately many residents throw rubbish into local water bodies and the council is encouraging the populace to change their behaviour.

Source: *DhakaTribune* (4/Nov2020), https://www.dhakatribune.com/bangladesh/nation/2020/11/04/ccc-launches-mosquito-eradication-programme

PALMYRA ATOLL: AN UNFORESEEN CONSEQUENCE OF RAT ERADICATION

Palmyra Atoll, sometimes referred to as Palmyra Island, is located due south of Hawaii, close to the equator. It has no permanent inhabitants but was used as a military base through the Second World War. Black rats were introduced to the inland during this time causing enormous environmental damage to both wildlife and plants. A program was begun in 2011 to eradicate the rodents, which proved successful and also led to the demise of the Asian Tiger mosquito, *Aedes albopictus*. Another unwanted pest on the island are coconuts and the rodents were eating the nuts and thereby controlling these plants. Coconuts impact seabird nesting sites and change the structure of the soil. Since the removal of the rats, coconut seedlings have shot up blanketing the island in a dense stance of plants, inhibiting the growth of native species. Now a second wave of eradication has had to take place – the aggressive removal of coconut plants. It is astonishing what the flow on effects can be in pest management!

Source: *Science Daily* (4/Nov2020), www.sciencedaily.com/releases/2020/11/201104194703.htm

SINGAPORE: DENGUE CONTINUES TO THREATEN

This year has seen a record number of dengue cases and cases remain high. Around 5-600 are being reported every week and the National Environmental Agency (NEA) is stating that populations of the mosquito vector, *Aedes aegypti*, are increasing in number. The concern is that dengue cases may again rise. Already too late

October, there has been almost 33,000 cases, with 28 deaths. Interestingly, this is the same number of deaths due to COVID-19.

Source: *The Straits Times* (30/Oct/2020), www.straitstimes.com/singapore/number-of-weekly-dengue-cases-remains-high-increase-in-aedes-mosquito-population

INDIA: RISE IN DENGUE IN MOHALI PROMPTS FOGGING

In Mohali, northern India, a rise in dengue cases has led to a call from health officials to begin fogging operations and door to door surveys to control adult mosquitoes. Some 33 cases of dengue have been reported from Mohali city alone.

Source: *Hindustan Times* (28/Oct/2020), www.hindustantimes.com/cities/actively-take-up-fogging-to-curb-mosquito-menace-mohali-dc/story-GMPY8TMmaSG6bTHFvnNq5O.html

USA: FIRST ASIAN GIANT HORNET NEST ERADICATED

In the most recent issue of the FAOPMA Magazine, it was reported that the Asian Giant Hornet was recently discovered in the US. This is a very large (length 45mm) and aggressive wasp originating from East and South East Asia and is known to decimate honey bee colonies. They can be so aggressive the media often calls them 'Murder Hornets'. The first ever nest was discovered in the US in the state of Washington, in a hollowed out tree. All individuals were removed via a vacuum and the site then sealed up. It is worth watching the video in the link below to see the process being undertaken.

Source: *SBS News* (28/Oct/2020), www.sbs.com.au/news/first-murder-hornet-nest-destroyed-in-us

GEELONG, AUSTRALIA: MOSQUITO TREATMENT PROGRAM TO BEGIN

In recent years there has been a mysterious outbreak of ulcers in patients from the regions south of Melbourne. In spite of a lack of strong evidence, some health officials believe that the bacteria (*Mycobacteria ulcerans*) could be transmitted by mosquitoes. Thus a comprehensive spraying program has begun against larval mosquitoes in the area. The first treatment is planned for late October to coincide with high tides that can initiate the hatching of the larvae of the southern saltmarsh mosquito *Aedes camptorhynchus*. Treatments will occur approximately monthly until autumn of next year.

Source: *Bay 93.9* (25/Oct/2020), www.bay939.com.au/news/local-news/122048-mosquito-treatment-program-starts-across-geelong

TEN BEST RODENT BASED HORROR MOVIES

Everyone loves a good horror film, right? But ever wondered which are the best horror films that featured rats? The team at Film School Rejects listed their all-time favourite top ten. I will leave it up to you to check out the web site to see which film was considered no. 1, but I am glad that they featured two of my favourites; *Willard* and *Ben*. As you may know, the latter movie was the inspiration for Michael Jackson's song *Ben*.

Source: *Film School Rejects* (24/Oct/2020), https://filmschoolrejects.com/rodent-horror-movies/

SINGAPORE: MEAT PROCESSING COMPANY FINED OVER COCKROACHES

Fuyen foods in Singapore, a meat processing company, was fined SGD$15,000 (USD$11,000) over poor hygiene standards. Not only were cockroaches found to be widespread, food was improperly stored. Previously the same company had their operating licence suspended for 13 days in 2019.

Source: *The Straits Times* (21/Oct/2020), https://www.straitstimes.com/singapore/environment/meat-processing-firm-fuyen-food-fined-for-lapses-in-hygiene-cockroach

INDIA: GAMBUSIA FISH RELEASED TO CONTROL MOSQUITOES

In New Delhi, India, *Gambusia* fish have been released into a reservoir within the grounds of an institute to control mosquito larvae. *Gambusia* are veracious feeders of mosquitoes, although have proved to be environmentally damaged when released into some countries such as Australia. The release of the fish is part of the strategy implemented to reduce mosquito-borne disease in the region.

Source: *Outlook* (20/Oct/2020), www.outlookindia.com/newsscroll/gambusia-

fish-released-in-reservoir-to-contain-mosquitobreeding/1959181

AUSTRALIA: TERMITE HOT SPOTS IN SYDNEY

Claims are that termite activity in the largest city in Australia have increased over the last 5 years. According to pest management experts, the five top hotspots for termite activity are Seaforth, Turramurra, Castle Hill, Campbelltown, and Gymea Bay. Unfortunately there is no hard evidence to support any of these claims.

Source: *7 News* (19/Oct/2020), https://7news.com.au/lifestyle/hidden-infestation-leaves-homeowners-with-250k-repair-bill-and-your-suburb-could-be-at-risk-c-1415499

MALAYSIA: MAJOR MOSQUITO PROBLEM

In Ipoh, Malaysia, there are major mosquito problems in the area. One retired health inspector claims he uses three cans of insect repellent per month along with vaporisers. It appears the mosquito problem relates to underground breeding in blocked drains.

Source: *The Star* (19/Oct/2020), www.thestar.com.my/metro/metro-news/2020/10/19/up-in-arms-over-mosquito-menace

ISRAEL: THE SPREAD OF THE LITTLE FIRE ANT

The little fire ant (*Wasmannia auropunctata*) was first discovered in Israel in 2005 and probably arrived in the nation towards the end of the last millennium. The ant came from Brazil, although how it arrived in the Middle East is unknown. What is clear however, is that the ant has subsequently spread primarily through the nursery industry with the movement of plants. Now many nurseries are infected with the little fire ant. Now the control of this invasive species has become a priority and a task force has been set up with the aim of eliminating the species. The first task will be to determine the geographic extent of the species, the second will be to get the public involved to map the ant's distribution, and finally methods of extermination will be examined.

Source: *The Jerusalem Post* (18/Oct/2020), www.jpost.com/israel-news/halting-the-spread-of-the-little-fire-ant-646163

UK: A PEST CONTROL WEB SITE WITHOUT ANY PEST CONTROL?

Why would a pest control web site have nothing on Pest Control you may ask? Well when it is from the famous and often controversial street artist known as Banksy, then it becomes no surprise. To him, someone who sells his art is called a 'pest'. For an artist who became famous for painting images of rats, perhaps his use of the words 'pest control' are fitting. Fortunately he allows the use of his image for non-commercial use, hence the reproduction here of some iconic images.

Source: *Pest Control* (18/Oct/2020), https://pestcontroloffice.com/index.asp

SCOTLAND: TRAINS CHAOS DUE TO ONE RAT

Train timetables in Scotland recently became chaotic after a pesky rat chewed through a power line triggering a major signal fault. Trains were forced to travel much slower causing delays throughout the network. The culprit of the incident was found dead, frizzled to a crisp after hitting copper.

Source: *Daily Record* (17/Oct/2020), www.dailyrecord.co.uk/news/scottish-news/peckish-rat-causes-rail-chaos-22861270

USA: DISCOVERY MAY LEAD TO NOVEL MEANS OF FIRE ANT CONTROL

A study at the University of Georgia in the US has found a unique 'supergene' in fire ant colonies, which determines if young queens leaves the colony. Queens that do not possess the gene are more likely to be attacked and killed by colony members. Perhaps in the future genetic manipulation may lead to colonies attacking their reproductive stage leading to a reduction in new colonies forming.

Source: *SciTechDaily* (17/Oct/2020), https://scitechdaily.com/supergene-discovery-leads-to-new-knowledge-of-fire-ants-pest-control-methods/

USA: CHICAGO AGAIN FOUND TO BE THE MOST RAT INFESTED CITY IN THE US

According to data from the US pest company Orkin, Chicago tops the list for the most rat infested city in the country. This is the sixth year in a row that Chicago has received this dubious honour. Beyond Chicago, the top 10 were Los Angeles, New York, Washington, DC, San Francisco, Detroit, Philadelphia, Baltimore, Denver, and

Minneapolis.

Source: *Fox* (17/Oct/2020), www.foxcarolina.com/chicago-is-the-rattiest-city-in-america-for-the-sixth-year-in-a-row/article_49cb04c7-1b7b-5ae4-9277-888b3898483a.html

SOUTH KOREA: JAPANESE ENCEPHALITIS CASES IN GYEONGGI PROVINCE

There were a total of three suspected cases of the mosquito-borne disease, Japanese Encephalitis during mid-October from Gyeonggi Province in South Korea. The patients were two women over 60 and one man in his 50's. The disease has a high fatality rate of around 30% and is preventable via vaccination and mosquito avoidance measures.

Source: *ProMED-ahead Digest* (17/Oct/2020), Vol. 99(39).

AUSTRALIA: CONCERNS OVER YELLOW CRAZY ANT SPREADING TO WET TROPICS

Yellow Crazy Ants have been found in the far north of the country around Townsville. This ant is considered to be one of the most invasive species on the planet and is very difficult to control as they form super colonies. By spitting formic acid onto its prey, it can overwhelm native animals and be very damaging to ecosystems. A new infestation of the ant was found in Alligator Creek, barely 5km from sensitive protected parklands. This is now the fifth infestation found in the areas Calls have gone out for Federal funding to stop the ant from spreading and to eradicate existing colonies.

Source: *The Guardian* (14/Oct/2020), www.theguardian.com/australia-news/2020/oct/14/yellow-crazy-ant-infestation-could-spread-to-queenslands-wet-tropics-conservationists-warn

INDIA: PATNA MUNICIPAL CORPORATION TO UNDERTAKE MOSQUITO CONTROL

In order to control the spread of dengue virus, Patna Municipal Corporation in India has launched an intensive mosquito control campaign involving fogging for adults and larvicide spraying. At the same time efforts are being made to control COVID-19 through the use of equipment common to the mosquito control program.

Source: *The Times of India* (12/Oct/2020), https://timesofindia.indiatimes.com/city/patna/pmc-takes-measures-to-control-mosquito-menace/articleshow/78608483.cms

INDIA: CAMPAIGN TO STOP DENGUE IN DELHI

An ongoing campaign against the spread of dengue virus has now moved to a stage where authorities are encouraging residents of Delhi to spend 10 minutes every Sunday to inspect their homes. People are asked to look for stagnant water and to drain it to prevent mosquito breeding. Location political figures are using the mantra "we will stop the breeding of dengue mosquitoes and protect our family and all of Delhi from Dengue." The government of Delhi has also launched a Dengue helpline to assist the public with matters pertaining to mosquitoes and the virus.

Source: *The Statesman* (11/Oct/2020), www.thestatesman.com/cities/we-will-stop-breeding-of-dengue-mosquitoes-protect-all-of-delhi-from-dengue-arvind-kejriwal-1502929071.html

TAIWAN: HIKERS WARNED OF THE DANGERS FROM TICKS

Warnings are going out to people who hike in forested areas of Taiwan. If people develop a circular like rash or flu like symptoms they should seek medical treatment for possible Lyme disease. Ticks are most likely encountered in forest regions or mountainous areas in Taiwan.

Source: *Taipei Times* (10/Oct/2020), www.taipeitimes.com/News/taiwan/archives/2020/10/10/2003744942

EUROPE: MOSQUITO ALERT APP LAUNCHED TO TRACK INVASIVE SPECIES

A number of exotic mosquitoes have been introduced into Europe with devastating consequences, resulting in outbreaks of mosquito-borne disease never previously seen. In order to better track the spread of the exotics, an app has been launched called 'Mosquito Alert'. The app helps people to recognise the most common invasive species and allows individuals to submit images of the mosquitoes and their habitats, which are then reviewed by a team of 50 scientists. The app has been in use in Spain over the last five years and have help to successfully track the spread of *Aedes albopictus* through the country. More than 18,300 mosquito sightings

were made during these years. Apps like come under the term 'Citizen Science' and by gaining the assistance of the community a more effective mosquito surveillance system has now been established.

Source: *Creaf* (9/Oct/2020), http://blog.creaf.cat/en/noticies-en/citizen-scientist-mosquito-alert-launched-europe-track-spread-mosquitoes/

AUSTRALIA: THE BATTLE TO ERADICATE FIRE ANTS

Fire ants were first introduced into Australia more than 20 years ago. Efforts to eradicate the exotic species have so far been unsuccessful, and even controversial at times. A program detailing the battle was recently released and available in the link below.

Source: *ABC Landline* (8/Oct/2020), www.abc.net.au/landline/eradicate-or-bust:-the-battle-to-eradicate-fire/12752822

FIRE ANT ART

A graduate student have created art out of dispersing fire ants. Horace Zeng placed various dabs of paint onto plain paper and then dropped fire ants into the paint. As the ants dispersed they created various beautiful patterns in their haste to leave the area. I recommend watching the YouTube link in the video below to watch the process.

Source: *Kottke.org* (8/Oct/2020), https://kottke.org/20/10/paintings-by-fire-ants

INDIA: GOVERNMENT AGENCIES FINED IN DELHI OVER MOSQUITOES

In New Delhi, a range of government agencies have received legal notices over mosquito breeding. This has included schools, police stations, a fire station, and several other locations. Officials from the South Delhi Municipal Corporation have stated that chemicals alone will not stop mosquito breeding, the cooperation of all is required.

Source: *The Times of India* (7/Oct/2020), https://timesofindia.indiatimes.com/city/delhi/mosquito-challans-to-delhi-govt-agencies-metro/articleshow/78530818.cms

JAPAN: MORE FIRE ANT SPOTTINGS

Reports of fire ants at ports in Japan are becoming increasingly common. The latest is at Aomi and Oi Piers in Tokyo Bay during early October. At both sites, several hundred fire ants were found in container yards. Insecticide applications were undertaken to destroy the ants.

Source: *NHK World-Japan* (7/Oct/2020), https://www3.nhk.or.jp/nhkworld/en/news/20201007_25/

GERMANY: FAT RAT RESCUED AFTER BECOMING STUCK IN DRAIN COVER

In Germany, fire fighters were called out to rescue an obese rat caught in a drain cover. The rescuers were forced to lift the cover and push the rodent out with a wooden wedge. It took 30 minutes to release the furry beast who was then taken to a veterinary clinic for some painkillers and a free feed. [SLD: I wonder how much rodent control goes on in that city!]

Source: *Unilad* (7/Oct/2020), https://www.unilad.co.uk/animals/chubby-rat-rescued-by-firefighters-after-getting-trapped-in-drain-cover/

US: 2020 IG NOBEL PRIZE WINNER: WHEN TWO LEGS MATTER

The Ig Nobel Prize is a satirical award given to scientists for what is considered to be trivial research. Its stated aim being to "honour achievements that first make people laugh, and then make them think." In the early days of the award many scientists felt quite embarrassed when they received an Ig Nobel prize as they felt their research was being criticised. However, now most see it as a badge of honour, as the reward is about having fun in science; something that is all too uncommon these days. The 2020 Ig Nobel Prize was awarded in mid-September and one of the most unusual prizes was given the researcher Richard Vetter who showed that many entomologists are scared by spiders – thus the difference of just two legs makes a huge difference in how we perceive the arthropod. His paper was published back in 2013 in American Entomologist and can be downloaded in full from: https://academic.oup.com/ae/article/59/3/168/6813

Source: *Ig Nobel Prize Winners* (17/Sep/2020), www.improbable.com/ig-about/winners/ ■

News from Academia

A Compendium of New Scientific Publications Relevant to the Pest Management Industry

Compiled by Stephen L. Doggett and David Lilly

THAILAND: SURVEY OF BORRELIA FROM RODENTS AND TICKS

Borrelia are a type of bacteria with several species from this genus that cause disease in humans. Most are transmitted by ticks, however the bacteria has not been well studied in Thailand. A survey of ticks and rodents using molecular means of testing found a number of species of *Borrelia* including B. miyamotoi, *B. yangtzensis* and B. *theileri*/B. *lonestari*. The study identified several species of this important genus for the first time from Thailand and showed that previously unrecognised human pathogens occur in the nation and pose a threat to human health.

Source: *Journal of Medical Entomology* (25/Dec/2020), https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaa279/6048521

MOSQUITOES IN ASIA AND AMERICA GREATER RISK FOR HUMAN DISEASE

Aedes aegypti, the mosquito that transmits dengue, also spreads a range of other mosquito-borne diseases including Zika virus. What is curious is that although *Aedes aegypti* originates from Africa, outbreaks of Zika virus tend not to occur in that continent. Researchers have found that the African strain of the mosquito is less efficient at transmitting the virus. When the mosquito spread around the world, it became adapted to the urban environment and preferred humans as a blood source. In the process it became a more efficient vector of viruses.

Source: *Science* (20/Sep/2020), https://science.sciencemag.org/content/370/6519/991?utm_source=STAT%20Newsletters&utm_campaign=7b63a54aa0-MR_COPY_01&utm_medium=email&utm_term=0_8cab1d7961-7b63a54aa0-150521553

CLIMATE CHANGE MAY MAKE HUMANS MORE ATTRACTIVE TO TICKS

Around the world tick-borne diseases are on the rise. A group of researchers from the University of California posed the question, what will happen with rising temperatures due to climate change in terms of the attractiveness of ticks to humans. What they found was quite astonishing; when the temperature was raised from 23C to 38C, the brown dog tick, *Rhipicephalus sanguineus*, was 2.5 times more likely to be attracted to humans over dogs. Currently the tick in southern areas of the US and expected to spread north with climate change. These findings were presented at the annual conference of the American Society of Tropical Medicine and Hygiene.

Source: The Guardian (17/Nov/2020), www.theguardian.com/science/2020/nov/16/study-finds-ticks-choose-humans-over-dogs-when-temperature-rises

NEW APP TO IDENTIFY MOSQUITOES FROM BUZZ

A researcher at the University of California has developed an app (Abuzz) that can identify a mosquito from the sound of its wings – the source of the annoying buzzzzz at night. The app can be used to identify the presence of dangerous mosquitoes such as *Aedes aegypti*. It may also prove to be useful in surveillance programs where traps are commonly used to collect and identify the mosquitoes within an area. It is expected that the app will be available in the next couple of months.

Source: *VOA* (16/Nov/2020), www.voanews.com/science-health/new-app-identifies-mosquitoes-buzzing-sound

ARTIFICIAL SWEETENERS FOR INSECT CONTROL

Prof. Chow-Yang Lee, who was feature as the Icon in last month's issue of the *FAOPMA Magazine*, recently published a review of the use of artificial sweeteners for insect control. The great advantage of these products is that they have low human toxicity, but are highly efficacious at killing insects, and many insects are willing to feed on them. The use of artificial sweeteners as a novel biorational control agent is discussed.

Source: *Journal of Economic Entomology* (6/Nov/2020), https://academic.oup.com/jee/advance-article-abstract/doi/10.1093/jee/toaa244/5957814?redirectedFrom=fulltext

HOW DO ANTS PROTECT THEMSELVES FROM PATHOGENS? THEY DRINK THEIR OWN BOTTOM ACID!

Ants produce formic acid for both defence against predators and to subdue their prey. However, recently it was found that after eating and drinking, ants would often clean the glands that produce the formic acid, which are located on the abdomen. In the process they consume some of the formic acid, which makes the gut of the ant very acidic. This allows for the growth of favourable bacteria, while inhibiting others. Thus through drinking their own bottom juices, ants can live longer!

Source: *elife* (4/Nov/2020), https://elifesciences.org/articles/60287

IS DIY TICK CONTROL EFFECTIVE?

Ticks are a cause of major human morbidity spreading infections like Lyme disease and Tick-borne Encephalitis virus. In many parts of the world people often encounter the ticks in their own backyard. Thus a simple and effective means of tick control would help to protect the community. Researchers from the US tested a granular form of gamma-cyhalothrin for the control of *Ixodes scapularis*, the main species that transmits Lyme disease. Tick populations were reduced by 97% after one week of application and by 89-97% 3-4 weeks post application. The results support the efficacy of a DIY product for tick control.

Source: *Journal of Medical Entomology* (27/Oct/2020), https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjaa212/5940896?redirectedFrom=fulltext

GETTING THE MESSAGE ACROSS: EDUCATING PEOPLE ON TICK MANAGEMENT

Knowledge of tick control in many parts of the US has been found to be extremely limited. Furthermore, getting the message to the public exceeds the ability of public health professionals. Researchers in the US took an alternative approach; they developed short story-based educational films called Spray Safe, Stay Safe, in order to better educate people on what insecticides to use for tick control. After viewing the films, many respondents felt more confident in undertaking tick management. The study demonstrated that using short films that can be posted to popular social media sites can be used to successfully educate the public on pest management.

Source: *Journal of Medical Entomology* (27/Oct/2020), https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaa230/5934869

LIGHT POLLUTION MAY INCREASE BITING ACTIVITY OF MOSQUITOES

Research from the University of Notre Dame in the US has suggested that increasing light pollution may encourage day biting mosquitoes to bite longer into the night. *Aedes aegypti*, commonly known as the dengue mosquito, is one such mosquito that bites normally during the day. Researchers testing the biting rate of the mosquito during different times of the day and night, and during the night if artificial lights were on, then the mosquitoes were twice as likely to

bite. Light pollution around urban areas could then encourage these mosquitoes to bite longer and increase the risk of mosquito-borne diseases.

Source: *Science Daily* (20/Oct/2020), www.sciencedaily.com/releases/2020/10/201020161202.htm

FIRE ANTS PREVENT DROWNING WHILE FEEDING ON LIQUIDS

Researchers from China and the US presented small cups of sugar solution to black fire ants. The problem being that for the ants to take a drink, drowning was a major risk. The researchers were amazed to see the ants build up a pile of sand grains in and around the small cups. The liquid via capillary action was absorbed into the grains where the fire ants could drink the liquid without the risk of drowning. Rather like using a straw to sip coke! This is the first time scientists have observed the behaviour of any creature employing a siphoning technique to harness liquids.

Source: *Al Khakeej Today* (17/Oct/2020), https://alkhaleejtoday.co/international/5124576/These-ants-feed-without-risk-by-using-the-phenomenon-of-capillarity.html

REVIEW: HOUSE FLY MONITORING REVIEW

Alec Gerry from the Department of Entomology at the University of California in the US, recently published a review of the various methods used to monitor the house fly, *Musca domestica*. House flies can be a serious nuisance, particularly in animal facilities and also spread food-borne pathogens. Dr Gerry details the various methods of monitoring from early days of using fly traps and sticky paper, to even the use of regurgitation spots on white cards. He emphasizes such methods give fail to give a true estimate of house fly numbers but can be used as a comparison over time.

Source: *Journal of Economic Entomology* (15/Oct/2020), https://academic.oup.com/jee/advance-article-abstract/doi/10.1093/jee/toaa229/5924105?redirectedFrom=fulltext

NEW CRYSTAL FORM OF DELTAMETHRIN MAY CIRCUMVENT RESISTANCE

Researchers from New York University have changed the crystal structure of deltamethrin through a simple process of heating and cooling. The outcome has been a different crystal structure of the chemical that is 12 times more effective against malaria carrying mosquitoes. Normally the mosquitoes pick up the insecticides through its feet when walking on chemically treated surfaces. The new crystalline form develops long tiny fibres that is more effectively absorbed by the insect. Beyond the advantage of increased efficacy, the new crystalline form has been found to be quite stable, capable of killing mosquitoes for up to three months.

Source: *ScienceBlog* (13/Oct/2020), https://scienceblog.com/518991/chemists-create-new-crystal-form-of-insecticide-boosting-its-ability-to-fight-mosquitoes-and-malaria/

NEW ZEALAND: TOWARDS PREDATOR FREE

New Zealand's project called Predator Free 2050, which aims to eliminate feral animals by the year 2050 has been well reported within the *FAOPMA Magazine*. Recently, a full review of the process was published and is available free online through the link below. The article summarizes current practices and reviews new technologies, and summarises the advantages and disadvantages of each. The paper also reviews the social opposition to the program. Never before has an eradication program been undertaken on a nationwide scale. If successful, then this could become a model for other such programs.

Source: *Journal of Integrated Pest Management* (4/Jun/2020), https://academic.oup.com/jipm/article/11/1/8/5850062

AMCA SPECIAL ISSUE ON MOSQUITO CONTROL EMERGENCY PREPAREDNESS

The American Mosquito Control Association recently teamed up with the Centers for Disease Control and Prevention to produce a special issue on "mosquito control emergency preparedness, and response to natural disasters". Most papers relate to mosquito issues surrounding hurricanes and severe storms. The entire journal is publicly available and thus if you are involved mosquito management, it would be worth bookmarking the link below.

Source: *Journal of the American Mosquito Control Association* (Jun/2020), https://mosquito-jamca.org/toc/moco/36/2s ■

Events Calendar*

Upcoming pest management events from across the globe

Is yours missing? Send details to Stephen Doggett or David Lilly!

FAOPMA-Pest Summit 2021
6-8 October 2021

PestExtra
16-18 March 2021
Excel, London, UK
http://pestex.org/

PestWorld 2021
2-5, November 2021
MGM Grand Hotel, Las Vegas, US

FAOPMA-Pest Summit 2022
Nagoya, Aichi, Japan

Future PestWorld Events
2022: 11-14 October, Boston
2023: 17-20 October, Honolulu
2024: 22-25 October, Denver
2025: 21-24 October, Orlando
2026: 20-23 October, Grapevine

*note that some meetings may be cancelled or postponed due to COVID-19, please check the conference web site for the latest update.

Name This Pest!

Worked out what this is from the last issue? Find out on the next page!

What????? This is no pest! Yet the person depicted on this bank note has had a vital role in the identification of many common urban pests. Who is he and what is his significance? Hint: this is a Swedish Kronor.

Stephen L. Doggett

Carl Linnaeus

The father of taxonomy

David Lilly

Carl Linnaeus (Carl von Linné after 1761) was a Swedish botanist, physician, zoologist and taxonomist. He was responsible for inventing and developing the system of botanical and zoological nomenclature, which is the method still used today for classifying and grouping plants and animals. Linnaeus also described many thousands of species using his system of classification and is often cited as being the "father of modern taxonomy". His work and contribution to science today is enormous and at the time of his death he was one of the most acclaimed scientists in Europe. A selection of urban pests Linnaeus described can be seen in the table and for many other species the abbreviation 'L.' indicates Linnaeus as the species authority.

Linnaeus attended the University in Lund from 1727 and Uppsala from 1728 where he studied medicine and botany. In 1729 he wrote his thesis on plant sexual reproduction, *Praeludia Sponsaliorum Plantarum*, and whilst continuing his botanical studies at Uppsala University he began to doubt the current system of the time of classifying plants, known as Tournefort's system. This prompted him to devise a new system of his own. After moving to the Netherlands and completing his doctorate (on malaria) Linnaeus published his first major work, *Systema Naturae* (1735), which introduced to the scientific community his idea of the binomial nomenclature system for classifying plants. He subsequently published several more books on the description and classification of plants before he returned to Sweden where he began work as a physician and married his finaceé Sara Elisabeth Moræa. During this time, he also helped with the establishment of the Royal Swedish Academy of Science.

In 1741 Linnaeus was appointed Professor of Medicine at Uppsala University, and shortly thereafter, Professor of Medicine, Botany and Natural History. In this role he undertook several expeditions over the years from 1741 to 1749 tasked with looking for plants that could be useful in medicine, but which also enabled him to further explore his passion for the description of new plants and animals and their respective classification. Finally, in 1750, he was appointed the Rector of Uppsala University and in 1751 published *Philisophia Botanica* which was a complete summary of the taxonomy system he had used in his previous publications and scientific works. In 1753 he followed the publication of *Philisophia Botanica* with *Species Plantarum*, which contained over 1,200 pages, two volumes, and described over 7,300 species. *Species Plantarum* is today regarded as the foundation of botanical nomenclature, which provides names to the results of the system of taxonomy (which in itself in the process of grouping and classifying organisms).

Over the years Linnaeus continued to update and revise his first major work, *Systema Naturae*, and in 1758 the tenth edition was released. This

Species Name	Common Name
Aedes aegypti	Dengue mosquito
Anthrenus scrophulariae	Common carpet beetle
Anthrenus verbasci	Varied carpet beetle
Blattella germanica	German cockroach
Blatta orientalis	Oriental cockroach
Cimex lectularius	Common bed bug
Dermestes lardarius	Larder beetle
Lepisma saccharinum	Silverfish
Monomorium pharaonis	Pharoah ant
Musca domesticus	House fly
Mus musculus	House mouse
Pediculus humanus humanus	Body louse
Periplaneta americana	American cockroach
Pthirus pubis	Pubic louse
Pulex irritans	Human flea
Rattus rattus	Black (roof) rat
Sitophilus oryzae	Rice weevil
Stegobium paniceum	Drugstore beetle
Stomoxys calcitrans	Stable fly
Tinea pellionella	Casemaking clothes moth

edition established zoological nomenclature (for animals) and, when viewed in historical context, the grounding that *Species Plantarum* and *System Naturae* contributed to the study of the natural sciences could perhaps only be surpassed by those of Charles Darwin one hundred years later, whose ideas were in turn influenced by the work of Linnaeus.

In 1753 the Swedish King Adolf Frederick named Linnaeus a knight of the Order of the Polar Star (thus becoming the first civilian to become a knight of this order) and eight years later, in 1761, the king granted nobility to Linnaeus. From thereafter, he took the name of Carl von Linné. Linnaeus continued to work in the following years, before declining health and a series of strokes plagued his final years. It is reported that, in rather depressing irony, towards the end of his life he enjoyed reading his own works but could not recognise himself as the author.

In recent years the work of Linnaeus has received criticism for his inherent racism and use of 'varieties' to describe different human races and ethnicities in his works. Rightfully, his use of derogatory and negative traits ascribed to darker-skinned ethnicities should be called the racism that it was (and is). And, as with many other scientists and naturalists of the age, separating their valid scientific contribution that underpin our fields of study today versus their other ideas that were wrong and have no place in the contemporary dialogue is, and will continue to be, a complex topic.

Interesting Fact: Linnaeus's remains in Uppsala Cathedral are classified by the International Code for Zoological Nomenclature as the 'type specimen' for Homo sapiens. This is as a result of him basing his classification of humans on examinations of his own body.

Further reading: The life and work of Carl Linnaeus is without doubt far too detailed and full of scientific advancement and achievement for it to be adequately covered in two pages of in this magazine. Readers interested in his life and times would be encouraged to explore more detail through information freely available on the internet or via one of the several biographies published about him. ■

Dr David Lilly is a Lead Entomologist for Ecolab's Global Pest Elimination – RD&E Division, and Associate Editor of the FAOPMA Magazine.
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Name This Pest!

Find out what this is in the next edition

Stephen L. Doggett

Hint: with mouthparts like that, this fly is sure to pack a punch!

New Story, New Research, New Product, New Event, New Ideas?

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Contributions to the FAOPMA Magazine are welcome

AIMS AND SCOPE

The FAOPMA Newsletter is published quarterly and aims to provide highly quality and science based information pertaining to the pest management industry for FAOPMA members.

Submissions must be relevant to the regions covering FAOPMA members (see www.faopma.com for a list of associations and the respective countries they serve). Submissions may include: original articles based on new research; new products; new events; conference reviews; news items; opinion pieces; stories on industry icons; tributes to past colleagues; book reviews; general articles on pests, pest science, or pest management; and articles relevant to new laws, regulations or other legal issues pertaining to the pest management industry.

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Authors: list authors by First name, Surname, include middle name/s as initials. Please also include title, affiliation and email if you wish to be contacted. The affiliations will appear at the end of the formatted submission. **Provide a head shot of the authors**, or the main author if there are multiple

Body of text: 600-1,500 words. Please include subheadings. Large articles may be considered at the discretion of the Editors.

Tables: if possible, avoid using tables.

References: avoid using references.

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Submissions will be published at the discretion of the Editors.

Editorial contacts are listed on the following pages. ■

FAOPMA Executive Committee

The leaders behind the Association

Mr. Vasili Tsoutouras (President)
Australian Environmental Pest Managers Association Ltd. (AEPMA)

Vasili Tsoutouras is the CEO of Allstate Pest Control, a family-owned and operated business. He has a great passion for the business and the pest management industry that has led him to be appointed to the position of South Australian Director of the AEPMA and he also sits as the President of the National Board, President of FAOPMA and President of the Global Pest Management Coalition.

Mr. Suchart Leelayouthyotin (President-Elect)
Thailand Pest Management Association (TPMA)

ExCom of Pacific Rim Termite Research Group (PR-TRG).
Chief Advisor of Thailand Pest Management Association (TPMA).
Regular Speaker of Thai-FDA Pest control Licensing Course.
Chairman and Founder of King Service Center, since 1977.

Mr. Taro Kanazawa (Vice President)
Japan Pest Control Association (JPCA)

Mr Kanazawa is the Director of Dynamic Sanito Inc. (Japan) and Dynamic Sanito SEA (Singapore). He has extensive experience in running pest control businesses and food-safety consultancy businesses in Japan and South East Asia.

Dr. Raymond Lee (Honorary Secretary)
The Pest Control Association of Malaysia (PCAM)

Dr Lee has been involved in the Pest management Industry since 1986 and is the founder of PEST DYNAMICS (M) SDN BHD. His involvement in the Malaysian Pest Control Industry also includes being the founder member and Protem COMMITTEE (1993/94) of the Pest Control Association of Malaysia. He has served in the Executive Committee of FAOPMA since 2013 and currently,serves as Honorary Secretary.

Mr. Raju Parulkar (Treasurer)
Indian Pest Control Association (IPCA)

Mr Parulkar is based in India. He undertook a post graduate degree from Pennsylvania State University in the USA. Mr Parulkar is a past President of the Indian Pest Control Association over 2015-17. He is the incoming Hon. Treasurer of FAOPMA for 2019-21.

Mr. Hector Binwek (1st Reserve Member)
The United Pest Management Association of the Philippines (TUPMAPHILS)

Mr Hector Binwek is the General Manager of Bio-Tech Environmental Services Inc. in the Philippines. He has more than 20 years' experience in the pest control industry and is the Immediate Past President of the Pest Control Association of the Philippines.

Mr Stephen Ware (Administrator)
Australian Environmental Pest Managers Association Ltd. (AEPMA)

Mr Stephen Ware is the Executive Director of the Australian Environmental Pest Management Association (AEPMA) as well as FAOPMA. He is an experienced manager of industry Associations, with a background in strategic management, government and corporate relations, stake holder management and human resource development. Stephen has proven success in regulatory matters in multiple jurisdictions.

Stephen Doggett (Chief Editor)
FAOPMA Magazine

Stephen is the Director of the Department of Medical Entomology in Sydney, Australia. He has over 35 years' experience, produced almost 700 papers and presented over 450 lectures. He is the Chief Editor of *'Advances in the Biology and Management of Modern Bed Bugs'*, and the industry magazine, *'Mosquito Bites'*. Stephen serves on a number of national and international committees, and is an internationally awarded photographer.

Dr David Lilly (Associate Editor)
FAOPMA Magazine

David is a Lead Entomologist for Ecolab's Global Pest Elimination, based out of Sydney Australia. He has over 15 years of experience in urban pest management and is responsible for providing RD&E leadership and technical support to Ecolab's Asia Pacific and Greater China pest businesses.

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Association Presidents

The leaders from the member associations that make up FAOPMA

Mr. Vasili Tsoutouras (Australia)
Australian Environmental Pest Managers Association Ltd. (AEPMA)

Vasili Tsoutouras is the CEO of Allstate Pest Control, a family-owned and operated business. He has a great passion for the business and the pest management industry that has led him to be appointed to the position of South Australian Director of the AEPMA and he also sits as the President of the National Board, President of FAOPMA and President of the Global Pest Management Coalition.

Ms. Huang Xiao Yun (China)
Chinese Pest Control Association (CPCA)

Ms. Huang is a trained medical Dr. and served as a director of public health in the Ministry of Transportation from 1983 to 1993. She is the founder of the Chinese Pest Control Association. She currently serves as the president of FAOPMA and the CEO of the Chinese pest control association. She is also the original proponent of "World Pest Day".

Mr. Choi Ping Yin (Hong Kong)
Hong Kong Pest Management Association (HKPMA)

Mr. Yin has been working in the pest control services industry for 43 years. He joined the Hong Kong Pest Management Association in 2000,and has been a member of the Executive Committee since 2014. He has taken up various functions such as Chairman of Training Sub-Committee, Honorary Treasurer, and Public Relations Officer. Currently, he is the elected President of HKPMA for the term 2018-2019.

Mr. Prakash Sasidharan (India)
Indian Pest Control Association (IPCA)

Mr Prakash Sasidharan is President of the IPCA and runs Orion Pest Solutions Pvt Ltd, the largest Indian owned pest control company with 42 branches across India and neighbouring countries, Nepal and Bhutan, with more than employees. Prakash Sasidharan is a first generation entrepreneur and created the organization from scratch and is a leading speaker on Team building and man management.

Mr. Muallif Zainal Asikin (Indonesia)

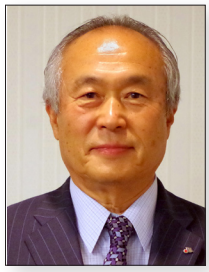
Indonesia Pest Control Association (ASPPHAMI)

Mr. Muallif Zainal Asikin has been working in the pest control industry for 32 years. He joined the IPCA in 2000 and has been an Executive Committee member since 2000, holding various positions over that time. He was Member of Parliament & Secretary Commission B (Economy Sector), House of Representatives, DKI Jakarta Province (2014-2019). Currently he is the elected President of IPCA for the term 2020-2025.

Mr. Kenjiro Yamaguchi (Japan)

Japan Pest Control Association (JPCA)

Mr. Yamaguchi founded Yokohama Sun-Self Co., Ltd. in 1970. He became a member of the board of directors, Kanagawa Prefecture Pest Control Association in 1988, and a member of the board of directors, Japan Pest Control Association in 1998. Mr. Yamaguchi became the chairman of the Japan Pest Control Association in May, 2018.



Mr. Won Soo Hong (Korea)

Korea Pest Control Association (KPCA)

Mr. Won Soo HONG studied agricultural chemistry at the Konkuk University in Seoul. He is the founder of Pestco Co.,Ltd in 1984 and has been the representative until today. In 1999, he became a director of KPCA(Korea Pest Control Association) and from 2015 he has been the President of KPCA. Mr. Won Soo HONG is also the 1st Reserve Member of FAOPMA.

Mr. Nor Hisham Badri (Malaysia)

Malaysian Pest Management Association (MPMA)

Mr. Badri studied economics at West Texas A&M State University. He was formerly the Honorary Secretary for PCAM (2013-2015), Vice President (Projects, 2011-2013), and Vice President (Communications, 2001-2003). He was member of the Working Group in developing the National Occupational Skills Standard (NOSS) in 2015. He was also instrumental in the development of Malaysian Standard (MS 1849) on Termite Management in 2005.

Mr. Danilo L. Magpantay (Philippines)

The United Pest Management Association of the Philippines (TUPMAPHILS)

Mr. Magpantay is an entomologist from the University of the Philippines, and a technical and former branch manager of Rentokil Philippines for over 14 years. Currently he operates his own Bugkil Pest Management business offering extermination and fumigation services. Mr. Magpantay is the President of The United Pest Management Association of the Philippines (TUPMAPHILS) for the ensuing year 2019-2020.

Mr. Albert Lee (Singapore)

Singapore Pest Management Association (SPMA)

Mr. Albert Lee joined the SPMA in 2005 and has held several positions including Secretary, Treasurer and now President. Mr Lee entered the industry in 2004 to help his families' pest management business, where much of his focus has been in vector control and the fight against dengue. One of Lee's aspirations is to encourage the younger generation of pest management professionals to be part of nation's essential service.

Mr. Sudash Liyanage (Sri Lanka)

Pest Managers Association of Sri Lanka (PMASL)

Mr. Sudash Liyanage is the founding President of PMASL and re-elected to the second term of office as President. He serves as the Head of Environmental Science of Hayleys Pest Management Division in Sri Lanka, with over 8 years' experience in the industry. He holds a Master of Business Management with an extensive range of managerial exposure to international marketing management, brand marketing and strategic management.

Prof. Hsiu-Hua Pai (Taiwan)

Taiwan Environmental Pest Management Association (TEPMA)

Prof. Pai is currently engaged in the prevention and control of mosquito-borne diseases and the efficacy testing of insecticides. She hosts a qualified insecticide efficacy testing laboratory certified by the Taiwan Environmental Protection Administration. Regularly Prof. Pai meets with professionals in the environmental pesticide manufacturing, retailer and vector control industries to discuss professional issues and provide expert advice.

Mr. Supanut Kiatyingpracha (Thailand)

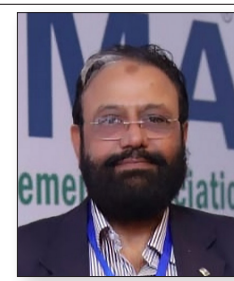
Thailand Pest Management Association (TPMA)

Mr. Kiatyingpracha has a MBA in Operation Management and a BSc from Kasetsart University. He is the Director of Thai Sky Clean. Previously, he was the Business Manager for BASF (THAI), and Service Manager, Pest Control Department, Property Care Services Ltd. He was the Chairman of Sponsors and Exhibitors at FAOPMA-Pest Summit 2017 and currently a member of the Thailand Pest Management Association Executive Committee, 2017-2019.

Mr. Ashraf Sattar Adamjee

Pakistan Pest Management Association (PPMA)

Ashraf Sattar Adamjee is the President of PPMA and Managing Director & Founder of the FUMICON Service Private Limited, established in 1983. He has lived in three continents and has attended numerous seminars and conferences, especially organized by NPMA (USA) to become professionally qualified in the field of Pest Management Industry He thereafter, implement the innovative technologies in Pest Management Industry in Pakistan.



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