FEDERATION OF ASIAN & OCEANIA PEST MANAGERS ASSOCIATIONS

MAGAZINE

APRIL 2021

- FAOPMA PRESIDENT
- COMPANY DIRECTOR
- ENTREPRENEUR
- MARATHON RUNNER
- PHILANTHROPIST

This Month's ICON:
JUNICHIRO KATAYAMA

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

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Front Cover: This month's ICON, Junichiro Katayama, looking fresh having just completed another 42km marathon. *Image courtesy Junichiro Katayama.*

A Plea: *Keep Safe!*

Much of the news of late has been dominated by the role out of the SARS-CoV-2 vaccine. With this there has been a renewed optimism in the economic markets around the world with the opinion that COVID-19 will soon be a horrible memory of the past.

The reality is that as of mid-April only some 2.4% of the world's population has received the vaccine. This means there are a lot (around 7.2 billion!) that are waiting for the jab and still at risk of contracting the disease. Even with the vaccine, you are not completely protected.

Even now, there is yet another major spike in disease with over 840,000 new cases in the last 24 hours (16/Apr/2021). Countries like India, Turkey, Germany, Iran, Philippines, Thailand, and many others, are just now experiencing the highest number of cases (and sadly deaths), since the pandemic begun.

Science (masks, physical distancing, vaccines) reduce the risk of disease! A recent study demonstrated that physical (=social) distancing reduces the risk of COVID-19 by between 6-28%. The wearing of masks is even better, with the risk reduced by 31-46%. While vaccines reduce the risk from serious disease by 75-85% depending on the brand. If you require more evidence on how effective vaccines are, watch this video: www.youtube.com/watch?v=p0x13N6WYY0

Thus you need to continue to protect yourself and your staff from COVID-19. ***Please do not become complacent and a statistic!***

In this issue of the FAOPMA Magazine, we continue with articles that feature the impact of COVID-19 on the pest management industry. Many of these come from last year's FAOPMA-Pest Summit meeting.

This year's conference will be virtual as well and is set to feature some of the biggest names in the global pest management industry. More information will be in the next issue, but keep an eye out on www.faopma.com/2021.■

Stephen Doggett (Chief Editor)

President's Report

Vasili Tsoutouras
President FAOPMA, Inc. and AEPMA

Again, I have the privilege of delivering this report as President of FAOPMA. It goes almost without saying that 2020 was a difficult year for FAOPMA member countries, but the development and deployment of COVID-19 vaccines gives us some hope of business and society returning slowly to normal. At the time of writing this report almost 359 million vaccine doses have been administered throughout the world.

The FAOPMA Executive Committee has met a number of times this year and these meetings have been very constructive. We have been sharing information about how each country is impacted by COVID-19 in the hope that we can help and support each other. One of the decisions taken this year was how to make the branding of FAOPMA more modern. To that end we have thought long and hard about how we could improve on the current logo, and a story on new FAOPMA logo, what it means and why it was selected, will appear in the next edition of the FAOPMA magazine.

I would like to take this opportunity to thank the Executive Committee for their hard work and if you have any issues you would like addressed please do not hesitate to contact our committee members.

The FAOPMA-Pest Summit 2021 Conference will be held virtually from the 6th - 8th October and the theme is "***Pest and Business: The New Realities***" The United Pest Management Association of the Philippines (TUPMAPI) are working hard putting the program together and once finalized we will share it with you. I hope to see you online at the conference.

As you are aware FAOPMA membership fees can now be paid via the FAOPMA website. Please don't hesitate to contact the FAOPMA Secretariat via email info@faopma.com should you have any queries.

Once again thank you for your continued support. ■

Yours sincerely,
Vasili Tsoutouras

FAOPMA PEST SUMMIT 2021

VIRTUAL CONFERENCE

PESTS AND BUSINESS

THE NEW REALITIES

OCTOBER 6 - 8, 2021

THE PROGRAM AT A GLANCE

OCTOBER 6

DAY 1

OPENING CEREMONIES, KEYNOTE TALKS, EXHIBITION HIGHLIGHTS

OCTOBER 7

DAY 2

PLENARY TALKS, CONCURRENT BREAKOUT SESSIONS AND PRODUCT PRESENTATIONS BY PLATINUM AND GOLD SPONSORS

OCTOBER 8

DAY 3

INDUSTRY FORUMS, PANEL DISCUSSIONS, MINI RODENT SYMPOSIUM AND CLOSING CEREMONIES

EXHIBITION BOOTHS

BE PART OF THE FAOPMA PEST SUMMIT 2021

- **PLATINUM**
  4,000 USD
- **GOLD**
  2,500 USD
- **STANDARD**
  1,250 USD

DELEGATE REGISTRATION:

(DISCOUNTS FOR 30 PARTICIPANTS AND ABOVE!)

EARLY BIRD RATE (UP TO JULY 30, 2021)
75 USD

REGULAR RATE
100 USD

IN ASSOCIATION WITH

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

ORGANIZED BY

THE UNITED PEST MANAGEMENT ASSOCIATION OF THE PHILIPPINES, INC.

PEAP

ANY QUESTIONS?

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Junichiro Katayama

An audience with an Icon

Interview by Stephen L. Doggett

Back in 2016, my two great colleagues, Prof. Dini Miller (USA) and Prof. Chow-Yang Lee (then Malaysia) and I, decided to meet up in order to finalize the book, *Advances in the Biology and Management of Modern Bed Bugs*, which we had been working on together. Mr Junichiro Katayama kindly provided us with space in his office in Japan to undertake the work. Juni (as he likes to be known) proved to be an extraordinary and most generous host; he assisted us in our endeavours, acted as a tourist guide while in Kyoto, and indulged us in some of the most amazing culinary experiences I have ever had in my life. We simply cannot thank him enough!

Yet there is so much more to Juni who is, without a question, one of the most socially responsible industry leaders in the country, but more on this later. He is also a self-obsessed marathon runner. The Cambridge-educated Junichiro Katayama is the President of Semco Co. Ltd., which is the largest supplier of pest management products in Japan. He is also a former President of FAOPMA, serving the organization over 2007-2009. I am very honoured to interview Mr Junichiro Katayama as the Icon for this issue of the FAOPMA Magazine.

Junichiro finishing a 42km marathon run

HOW MANY YEARS HAVE YOU BEEN IN THE PEST CONTROL INDUSTRY?

Since 1995 when I came back from the UK to Japan and joined Semco, thus 26 years. How time flies!

WHAT HAVE BEEN YOUR MAIN POSITIONS DURING THIS TIME?

I became the President of Semco in 2000. I was a member of the Board of Directors of the Japan Pest Control Association, responsible for international affairs from 2004 to 2013.

I also was one of the Board Members of FAOPMA from 2001 – 2019 and the President of FAOPMA from 2007 – 2009 (I believe that I had served the Federation for the longest period among its board members' history.)

PLEASE TELL THE READERS HOW YOU CAME INTO THE BUSINESS OF PEST CONTROL:

It was by chance. I inherited my family business from my mother, who managed the company for ten years after the sudden death of my father who founded Semco, which happened to be in the pest control industry. I had worked for a commercial bank for some years, followed by postgraduate studies in Cambridge UK, and so it was time for a change! Any sector would do, so I did not mind following in the family business, which at the time was a modest equipment manufacturer.

PRIOR TO WORKING IN THE PEST CONTROL INDUSTRY, YOU WERE EMPLOYED BY THE INDUSTRIAL BANK OF JAPAN AND HOLD A LEGAL AND ECONOMIC DEGREE. HOW DID THE EXPERIENCE IN THE BANK AND YOUR DEGREES HELP IN YOUR CURRENT ROLE?

The variety of career experiences gave me a balanced view of my life. I learned substantially how a company should be managed based on

NICCO, the charity that Junichiro supports, helps funds child care programs in Kenya.

figures/data when I was working in a bank as a corporate financial officer. It further broadened my mind when I was at Cambridge, where elite students from all over the world gathered to study more advanced economics. Both experiences

Junichiro speaking at Pest Summit 2016 in Singapore.

Tohoku in northern Japan was severely damaged in the 2011 earthquake/tsunami. Junichiro's company Semco led the program for fly control.

enable me to look at the pest management industry more objectively and sometimes with a more critical viewpoint.

DO YOU THINK IT IS USEFUL FOR PEOPLE TO HAVE OUTSIDE EXPERIENCE BEFORE ENTERING THE PEST MANAGEMENT INDUSTRY?

Absolutely! Life is full of joy when you have more experience. Diverse and rich backgrounds provide us a better understanding of our society.

YOUR COMPANY, SEMCO IS RENOWNED FOR ITS LEAN WORKFORCE, YET BEING THE LARGEST SUPPLIER OF PEST MANAGEMENT PRODUCTS IN JAPAN. YOUR COMPANY ALSO PRODUCES PROPRIETARY AND UNIQUE PRODUCTS FOR THE JAPANESE PEST MANAGEMENT MARKET. I AM SURE A LOT OF BUSINESS OWNERS WOULD LIKE TO LEARN THE SECRET OF YOUR SUCCESS. CAN YOU SHARE THIS WITH OUR READERS?

Yes, this is our secret (but open to all my friends). There are several distinctive and unique characteristics of my company. One: There is no hierarchy (except myself as the President). We do not have managers or executives. We have only 50 staff, a very lean organization for the size of our sales and profits. Every staff has the same access to the company and customer information. We share reports via the company database every day or sometimes even every hour. My most important role is to read all the reports and provide feedback to my staff to enhance communication. Two: We do not have personnel appraisal and no incentives. This is

important. Because we work as ONE team, we do not evaluate individual contribution. We only care for the results as a team and thus we are very outward-oriented. The annual salary is dependent on seniority. As long as the base salary is comparable to that of the labor market standard, all staff can expect a very stable life. Our staff tend to have many children (3 or 4) and buy a house with a long-term loan. Three: a no "work-life balance". We value the "work and life" concept, but both are inseparable. We grow as a person through our work experience. We think about personal life issues when working, and we think about work even on the weekends. Both should not contradict each other. What we do as a good father or mother, or as a friend, we also do it at work. There is an equal treatment and no biases towards one or the other.

WHAT WERE THE BIGGEST CHANGES IN THE INDUSTRY THAT YOU OBSERVED DURING THIS TIME?

Pest management professionals have become more "professional." In the past, they looked like "manual workers," but now "consultants" are wearing suits and ties. There are more university graduates too in our industry.

WHAT HAVE BEEN SOME OF THE SPECIAL CHALLENGES THAT THE JAPANESE PEST MANAGEMENT INDUSTRY HAS FACED?

Low-profit margin, difficulty in recruiting new good employees, and low growth rate. All three are interconnected and cause a vicious circle.

WHAT IS YOUR MOST PROUD ACHIEVEMENT

DURING YOUR TIME IN THE INDUSTRY?

There are several proud achievements that I have had. First, my company has been growing consecutively for 20 years. I ran a full marathon 20 times with my staff during these ten years. Next, please see below.

I ALLUDED TO YOUR SOCIAL RESPONSIBILITY IN THE INTRODUCTION. READERS MAY NOT KNOW THIS, BUT DURING THE GREAT JAPAN EAST EARTHQUAKE AND TSUNAMI IN 2011 (WHICH WAS REGARDED AS THE MOST EXPENSIVE NATURAL DISASTER IN THE WORLD), YOU AND THE NON-GOVERNMENTAL ORGANIZATION, NICCO, THAT YOU REPRESENT, HAD LED A LARGE PROGRAM MANAGING FLIES ALONG A 400 KM COASTAL STRIP TO AVERT A PUBLIC HEALTH CRISIS IN THE DISASTER ZONE. CAN YOU PLEASE EXPAND ON THIS?

When spring had come in 2011, the flies started to appear from the massive amount of trash caused by the tsunami. Tohoku (northeast) region of Japan is famous for its rich sources of fish, and lots of seafood warehouses were damaged and washed away by the tsunami. Our company staff carried out an extensive inspection along the affected areas, planned and established an area-wide fly management program. NICCO, which was the non-governmental organization I represented, was funded $2.4 million USD from the government. The Japan Pest Control Association deployed as many as 6,000 technicians for six months. The whole affected area was approximately 400 km of sea line, so coordinating with each local municipality was crucial. The success of this historical project had prevented the residents from contracting communicable diseases, especially those related

to gastroenteritis, which the flies potentially could transmit. NICCO and JPCA were awarded by the Environmental Protection Ministry and the Health Ministry for their significant contribution.

WHAT OTHER PROJECTS ARE UNDER YOUR LEADERSHIP THAT NICCO HAS UNDERTAKEN?

There were a number of them. The Post-Flood Mosquito control and sanitation project in Thailand in 2012, the Post-flood disinfection project in western Japan in 2018, and the Organic Olive oil project in Jordan since 2008. We also have projects in Kenya (Child Care program), in Jordan (Syria refugee aid), and India (organic farming project). Starting this year, there will be a natural pyrethrin project in Kenya. I spend 20% of my time on NICCO activity as a Vice President and 10% on the water polo activity where I am a local Club President.

NOW TO A MORE RECENT EVENT, HOW HAS THE COVID-19 PANDEMIC AFFECTED THE PEST MANAGEMENT INDUSTRY IN JAPAN?

Actually, not too much. In major cities like Tokyo and Osaka, the decline of pest control demand might be observed, but in most local towns, they were not distinct. COVID-19 has not hit Japan too hard. We managed to control it below a certain threshold level, so our day-to-day activity is still business as usual.

AS NOTED ABOVE, YOU ARE A PAST PRESIDENT OF FAOPMA AND THAT YOU HAVE HAD VARIOUS EXECUTIVE ROLES WITHIN THE ORGANIZATION OVER THE YEARS. PLEASE TELL THE READERS ABOUT SOME OF THE SUCCESSES YOU HAD AT THE HELM OF FAOPMA.

My most significant contribution to FAOPMA was to initiate the integration of FAOPMA and

Junichiro is the most gracious host and is here sharing a saké with Prof. Chow-Yang Lee in a traditional Japanese restaurant in 2016.

NICCO supporting programs in the Philippines.

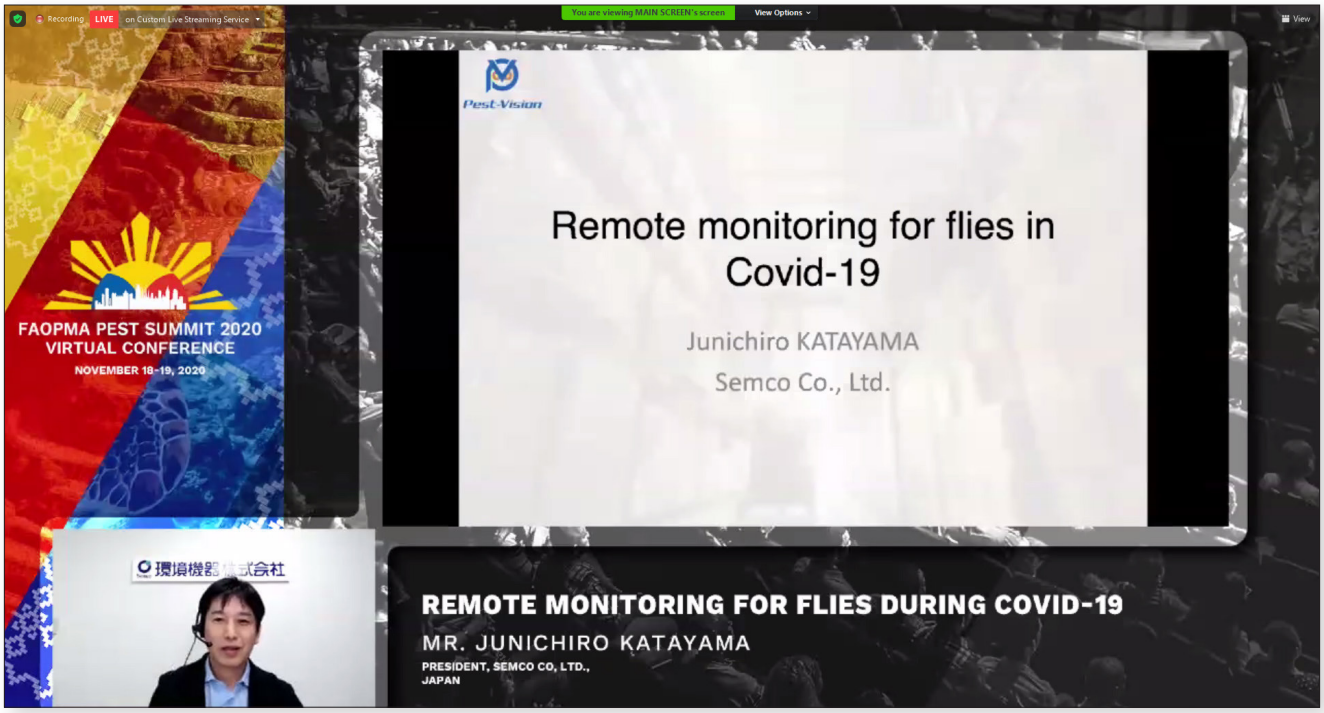
Pest Summit. It was becoming increasingly challenging to hold two large conventions in Asia as they competed for the same resources regarding sponsorships and participants. I visited Hong Kong, Thailand, Singapore, and other places since 2007 to persuade and lobby the industry leaders on the need for integration. Many leaders became very cooperative in the end, and the two organizations were finally integrated in 2017. It took nearly ten years to achieve, but it was well worth doing.

DO YOU HAVE ANY ADVICE FOR FUTURE FAOPMA PRESIDENTS?

The most important thing is to realize that our industry is still immature and has vast room for improvement. Each Association should lobby their respective government on the need for a licensing program for pest management professionals in their country. This could eventually lead the pest management industry towards a respectable and high value-added industry. FAOPMA shall support all its member countries to do that, and most importantly, future FAOPMA Presidents shall represent our voice to the people and governments.

WHAT ARE THE CHALLENGES THE JAPANESE AND GLOBAL PEST CONTROL INDUSTRY WILL FACE IN THE FUTURE?

Junichiro Katayama hosting colleagues at Semco headquarters, 2016. Included in the picture are two past FAOPMA Magazine ICONs; Dr Hirao on the far right and Prof. Lee back left.



Junichiro Katayama speaking at FAOPMA-Pest Summit 2020 Virtual Conference. Juni's topic was "Remote Monitoring for Flies"

Acquiring young talent will be increasingly challenging if we do not upgrade. Other industries such as IT or Finance can attract talented young people, but not our industry. Sad to say, but it is true. Our industry should be more profitable and should offer a better remuneration package to employees. Science should support our industry. More students should choose to specialize in entomology. AI technology and IoT should be introduced to improve productivity. Pest management professionals should be more respected in society.

NOW THAT JAPAN IS IN THE PUBLIC EYE WITH THE UPCOMING OLYMPIC GAMES, WHAT PRESSURES HAS THERE BEEN ON THE PEST MANAGEMENT INDUSTRY WITH THE GAMES?

The Tokyo Olympic Games should not accelerate COVID-19 cases in Japan. The Japan Olympic Committee makes very detailed operation manuals to host athletes from all over the world. Our industry plays a vital role in carrying out disinfection services and making sure Japan is a very clean and safe country.

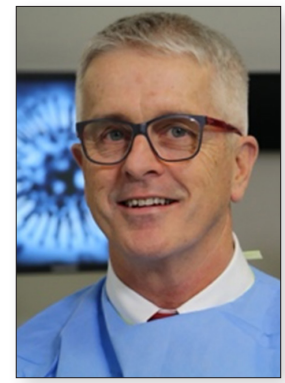
WHAT DO YOU THINK THAT JAPAN CAN TEACH THE REST OF THE WORLD ABOUT PEST CONTROL?

Probably the importance of inspection and monitoring in pest management. In my opinion, the Japanese pest management industry likely collects and maintains the most extensive and robust monitoring data and utilizes them heavily in decision-making for pest treatment.

WHERE DO YOU SEE THE PEST CONTROL INDUSTRY IN 30 YEARS?

Remote monitoring will become standard practice, and a robot will primarily carry out the service itself. Our job is to design a pest management plan, monitor pest problems' status, and improve the plan. It will likely become a more data-driven automation process.

Thank you Juni for your amazing insights on the pest management industry Juni. Also, I must congratulate you, NICCO, and your team, on all the extraordinary philanthropic work that you have undertaken over the years. The entire industry is very proud of your achievements. ■



I was the Australian Doctor on the WHO's COVID-19 Mission to China

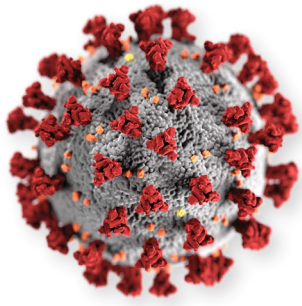
Here's what we found about the origins of the coronavirus

Dominic E. Dwyer

The annual FAOPMA-Pest Summit has a proud history of having some of the greatest speakers in the field of pest management and from the world of science.

At last year's meeting, we were privileged to have Prof. Dominic Dwyer, a world renown infectious disease specialist, to speak on COVID-19 from a clinical perspective and to discuss the future of the disease.

Recently he was asked by the World Health Organization to be part of a team of global experts to visit China and to examined the origins of SARS-CoV-2, the virus that causes COVID-19. As he provided such an excellent presentation at FAOPMA-Pest Summit, and that there has been a lot of debate about the origins of the virus, we thought that we would reproduce the article



Prof. Dwyer wrote, which appeared in Conversation (an academic based web site). In the first part of the article Prof. Dwyer describes the aims of the WHO mission.

The WHO Mission on the Origins of SARS-CoV-2

Our mission in Wuhan was a fascinating yet difficult experience – the science was wide-ranging, and the media and political pressure extraordinary.

The mission started in late 2020, with the WHO team meeting on Zoom (unfortunately usually on Geneva time zones) to plan the studies. Then we had two weeks 'hard' hotel quarantine with daily online meetings with Chinese colleagues from various government agencies, led by the National Health Commission. This was followed by a 'light' quarantine for another two weeks, analogous to a sporting team 'bubble', where we could meet face to face, but not wander around the city.

The work of the joint WHO–China project was organised into three areas:

- the animal and environmental aspects of the early days of the pandemic in Wuhan,
- the viral molecular epidemiology, and,
- the early clinical and epidemiology studies.

We visited the Huanan 'wet' market, the Wuhan Institute of Virology and the public health laboratories in both the Hubei Province CDC and the Wuhan CDC. It was easy to see how the market was such an 'amplifier' for the outbreak – crowded, lots of small stalls, and dubious ventilation and drainage.

A list of origins hypotheses was generated and 'rated' on the basis of the available evidence, and further work in China and elsewhere recommended. The viral sequence data and the epidemiology suggested there had been substantial unrecognised circulation in Wuhan in December 2019 through asymptomatic or mild disease transmission, and the 174 severe cases notified in December were but the tip of the iceberg.

Then back to experience hotel quarantine Sydney-style. The work has been punctuated by 12 nose/throat swabs, five blood samples, 20 oxygen and blood pressure measurements, 87 temperature assessments and more than 30 media interviews with outlets across Australia and around the world. I would like to acknowledge the support and assistance of the NSWHP Incident Management Team, colleagues at the ICPMR and Public Health Pathology, and the Strategic Communications team. The sooner the vaccine is administered to everyone the sooner we can get back to normal!

The Conversation Article; I was the Australian Doctor on the WHO's COVID-19 Mission to China.

I was the Australian doctor on the WHO's COVID-19 mission to China. Here's what we found about the origins of the coronavirus

As I write, I am in hotel quarantine in Sydney, after returning from Wuhan, China. There, I was the Australian representative on the international World Health Organization's (WHO) investigation into the origins of the SARS-CoV-2 virus.

Much has been said of the politics surrounding the mission to investigate the viral origins of COVID-19. So it's easy to forget that behind these investigations are real people.

As part of the mission, we met the man who, on December 8, 2019, was the first confirmed COVID-19 case; he's since recovered. We met the husband of a doctor who died of COVID-19 and left behind a young child. We met the doctors who worked in the Wuhan hospitals treating those early COVID-19 cases, and learned what happened to them and their colleagues. We witnessed the impact of COVID-19 on many individuals and communities, affected so early in the pandemic, when we didn't know much about the virus, how it spreads, how to treat COVID-19, or its impacts.

We talked to our Chinese counterparts — scientists, epidemiologists, doctors — over the four weeks the WHO mission was in China. We were in meetings with them for up to 15 hours a day, so we became colleagues, even friends. This allowed us to build respect and trust in a way you couldn't necessarily do via Zoom or email.

This is what we learned about the origins of SARS-CoV-2.

Animal origins, but not necessarily at the Wuhan markets

It was in Wuhan, in central China, that the virus, now called SARS-CoV-2, emerged in December 2019, unleashing the greatest infectious disease outbreak since the 1918-19 influenza pandemic.

Our investigations concluded the virus was most likely of animal origin. It probably crossed over to humans from bats, via an as-yet-unknown intermediary animal, at an unknown location. Such "zoonotic" diseases have triggered pandemics before. But we are still working to confirm the exact chain of events that led to the current pandemic. Sampling of bats in Hubei province and wildlife across China has revealed no SARS-CoV-2 to date.

We visited the now-closed Wuhan wet market which, in the early days of the pandemic, was blamed as the source of the virus. Some stalls at the market sold "domesticated" wildlife products. These are animals raised for food, such as bamboo rats, civets and ferret badgers. There is also evidence some domesticated wildlife may

be susceptible to SARS-CoV-2. However, none of the animal products sampled after the market's closure tested positive for SARS-CoV-2.

We also know not all of those first 174 early COVID-19 cases visited the market, including the man who was diagnosed in December 2019 with the earliest onset date.

However, when we visited the closed market, it's easy to see how an infection might have spread there. When it was open, there would have been around 10,000 people visiting a day, in close proximity, with poor ventilation and drainage.

There's also genetic evidence generated during the mission for a transmission cluster there. Viral sequences from several of the market cases were identical, suggesting a transmission cluster. However, there was some diversity in other viral sequences, implying other unknown or unsampled chains of transmission.

A summary of modelling studies of the time to the most recent common ancestor of SARS-CoV-2 sequences estimated the start of the pandemic between mid-November and early December. There are also publications suggesting SARS-CoV-2 circulation in various countries earlier than the first case in Wuhan, although these require confirmation.

The market in Wuhan, in the end, was more of an amplifying event rather than necessarily a true ground zero. So we need to look elsewhere for the viral origins.

Frozen or refrigerated food not ruled out in the spread

Then there was the "cold chain" hypothesis. This is the idea the virus might have originated from elsewhere via the farming, catching, processing, transporting, refrigeration or freezing of food. Was that food ice cream, fish, wildlife meat? We don't know. It's unproven that this triggered the origin of the virus itself. But to what extent did it contribute to its spread? Again, we don't know.

Several "cold chain" products present in the Wuhan market were not tested for the virus. Environmental sampling in the market showed viral surface contamination. This may indicate the introduction of SARS-CoV-2 through infected people, or contaminated animal products and "cold chain" products. Investigation of "cold chain" products and virus survival at low temperatures is still underway.

Extremely unlikely the virus escaped from a lab

The most politically sensitive option we looked at was the virus escaping from a laboratory. We concluded this was extremely unlikely.

We visited the Wuhan Institute of Virology, which is an impressive research facility, and looks to be run well, with due regard to staff health.

We spoke to the scientists there. We heard that scientists' blood samples, which are routinely taken and stored, were tested for signs they had been infected. No evidence of antibodies to the coronavirus was found. We looked at their biosecurity audits. No evidence.

We looked at the closest virus to SARS-CoV-2 they were working on — the virus RaTG13 — which had been detected in caves in southern China where some miners had died seven years previously.

But all the scientists had was a genetic sequence for this virus. They hadn't managed to grow it in culture. While viruses certainly do escape from laboratories, this is rare. So, we concluded it was extremely unlikely this had happened in Wuhan.

A team of investigators

When I say "we", the mission was a joint exercise between the WHO and the Chinese health commission. In all, there were 17 Chinese and ten international experts, plus seven other experts and support staff from various agencies. We looked at the clinical epidemiology (how COVID-19 spread among people), the molecular epidemiology (the genetic makeup of the virus and its spread), and the role of animals and the environment.

The clinical epidemiology group alone looked at China's records of 76,000 episodes from more

than 200 institutions of anything that could have resembled COVID-19 — such as influenza-like illnesses, pneumonia and other respiratory illnesses. They found no clear evidence of substantial circulation of COVID-19 in Wuhan during the latter part of 2019 before the first case.

Where to now?

Our mission to China was only phase one. We are due to publish our official report in the coming weeks. Investigators will also look further afield for data, to investigate evidence the virus was circulating in Europe, for instance, earlier in 2019. Investigators will continue to test wildlife and other animals in the region for signs of the virus. And we'll continue to learn from our experiences to improve how we investigate the next pandemic.

Irrespective of the origins of the virus, individual people with the disease are at the beginning of the epidemiology data points, sequences and numbers. The long-term physical and psychological effects — the tragedy and anxiety — will be felt in Wuhan, and elsewhere, for decades to come. ■

This article first appeared in the Conversation and reprinted under Creative Commons licence: https://theconversation.com/i-was-the-australian-doctor-on-the-whos-covid-19-mission-to-china-heres-what-we-found-about-the-origins-of-the-coronavirus-155554

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Email: Dominic.Dwyer@health.nsw.gov.au

Remote Monitoring for Flies During COVID-19

Novel AI-based technology is rapidly changing the field of pest monitoring

Junichiro Katayama

I am the President of Semco, which is the largest distributor of professional pest manager products in Japan. Last year we celebrated our 50 years anniverary.

I have been involved in FAOPMA since 2001 as a Board Member for a total of 16 years, arguably the longest among past members, and was President of FAOPMA over 2007-2009.

Today I will review the topic of remote monitoring for flies especially during the COVID-19 pandemic.

First, I must emphasize (again!) that the concept of Integrated Pest Management (IPM) is the foundation of our industry. Yet, I must say that this concept is not fully exploited by our industry due to many reasons that I will discuss in this paper.

According to IPM principles, data is essential, and monitoring is a key component of IPM. Installing light traps to catch and monitor flying insects, and the placement of glue traps for crawling insects, are both basic pest management practices.

Typically these traps are checked monthly, by counting and identifying species of pests collected. A report follows that analysis the results, which is then submitted to the customer.

Based on the monitoring data, the recommended treatment would be carried out.

If the monitored pests are species from outside the premise, we are supposed to check whether the exclusion measures are sufficient. For example, if you monitor and detect larger flies such as house flies and flesh flies, you need to check the outside bins or if there are agricultural fields nearby. In that case, you may need to check if windows and doors are properly closed and sealed, install more light traps indoors, or you may have to treat the outside walls with pesticide.

If the identified species suggest the issues are from indoors, then cleaning, trapping, and chemical applications, would be possible treatment options. For example, if insects such as fruit flies and phorid flies are collected, you may have to clean the breeding grounds. If you find moth flies, then you may have to clean drain pipes and grease traps, possibly with a foam application, where the appropriate pesticides may or may not be mixed.

The above process of IPM is easy to say in theory, but difficult and time consuming to practice. Monitoring is very important but a downside is that it is a very expensive task. According to the

Semco entomologists, it takes approximately 15 minutes per light trap to analyze, which becomes 30 minutes in a summer season when more flies are typically trapped. Then to enter the results into the reporting format requires even more time.

For example, if you manage 20 factories per a single pest technician with the placement of 10 light traps per factory, then you need check 200 light traps. This requires 3,000 minutes or 50 hours every month just to analyse the traps. Plus you are likely also to have monitoring traps for crawling insects, which takes a similar amount of time to inspect and analyse, along with the production of reports; all very time-consuming processes.

It is estimated that 50% of the working hours of technicians, who are typically valuable entomologists, is spent on this monitoring process.

In addition, there are differences in the level of proficiency among employees. Some technicians can identify pests better than others. This leads to inconsistency and inaccuracy of monitoring results between sites and over a period of time.

Thus, the monitoring is a very expensive and labour-intensive job, yet, typically only once-a-month data is obtained.

Taking into account the fact that a pest problem like fruit flies can develop quite quickly, waiting for one month to obtain monitoring data is not timely at all. For example, using a simple mathematical equation, 40 fruit flies can become 150,000 flies in just 15 days. To monitor once a month is not enough at all, as it is often too late!

Ideally, monitoring data should be obtained effortlessly and inreal time. Is this possible? Yes, it is!

In recent years we have seen remarkable developments in image analysis technology through Artificial Intelligence (AI). The use of AI in numerous industrial fields has becomes increasingly popular. AI in a factory can tell defective products, or it can check the behaviour or workers. In many countries, AI face recognition is used to track and trace people. AI can recognize VIPs, or people on a black list. *AI is changing our life*!

My company has developed a real time remote monitoring system for flying insects using visual recognition AI. The product is called 'Pest Vision'.

Pest Vision is a light trap with cameras that connects to cloud-based AI. Pest vision can be installed at the sites where real time monitoring is conducted. The cameras are controlled by a microcomputer that commands that images are taken at any set interval, which are then uploaded to the cloud via the internet.

The results, including counts and identifications, are displayed on a website which can be downloaded in CSV format. The data can also be viewed as graphs. This automated process enables the rapid production of reports.

If a sample consists of fruit flies only, by our AI, the counting accuracy is 100%, but identification accuracy is 73%. Some are mistakenly identified as phorid flies or psocids (book lice). In another example of flies, the counting accuracy was again 100%, however identification accuracy was 74.5%. There is similar tendency to mistakenly identify book lice as fruit flies. We are still working to develop and improve on the accuracy of our AI. It is already practical, and can be used in real operations, but still needs to be improved to be compatible with human analysis.

Let's talk about the advantages of AI based monitoring:

1. Reduction of working hours

As discussed earlier, the time spent by technicians

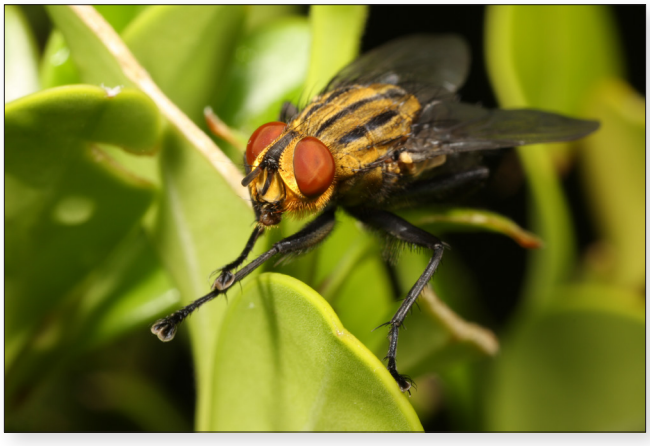
to analyze traps could be up to 50% of their working time. By using an AI based monitoring system, all of the 50% of working time would be saved, as the counting and identification task will be undertaken automatically. Technicians can now spend more time on going to the field, talking to customers, and making recommendations to directly improve pest problems. The monitoring data is important, but ideally it should not take up so much time of experienced technicians, who are valuable assets to the company.

2. Optimization of work

With the AI based monitoring, it is possible to monitor the field situation constantly. This advantage makes it possible for pest management professionals to visit customers as demand requires it. Since the AI based monitoring can set up a threshold level, it is possible to take immediate action when necessary. Or if there is no issue, the scheduled visit can be skipped and only a report needs to be sent to the customer. This is particularly important now during the COVID-19 pandemic when minimal access to the field is required to reduce the risk of the disease.

3. More detailed data

With AI remote monitoring technology, it is possible to gather significantly more information than the current practice has ever yielded. Now we can opt for daily data. In situations with daily monitoring, you can sometimes see a sudden increase of insects during the middle of the month. Then you can ask your customer what



happened during that particular period of time, such as renovation work on that day which led to more flying insects coming in to the facility. You can find out the cause of sudden spikes!

In another example, we monitored hourly data. We found a regular surge of insects in the morning and again in early evening. You can probably guess that this related to insects entering the facility together with inventories through open doors in the morning and goods leaving in the early evening. In this particular case, it would be recommended to install insect proof air curtains to prevent flies entering the facility. Following installation, we can also verify the effectiveness of this intervention with the hourly monitoring data.

Heat maps have been developed to show how COVID-19 has spread across the USA. We can make a similar animation map with AI based monitoring system for insects.

Today the possibility of AI based monitoring system is now becoming a reality. While it is still in the developmental stage, once consistent results are produced, AI will change the face of the industry. ■

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

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COVID-19 Challenges and Opportunites to Business

A perspective from an international pest management company

David Lilly

The COVID-19 pandemic has presented society and industry with innumerable challenges of varying complexity and degree of disruption, and it almost goes without saying that the professional pest management industry has not been immune from these impacts. Despite this, the professional pest management industry has also been somewhat fortunate to be one of very few service industries that have also had some business opportunities present during this period. As we leave the year 2020 behind, it is worthwhile to look back at some of the challenges our businesses have faced since the pandemic began, and at the same time look ahead towards some of the opportunities that might present over the coming months and years.

Challenges

It would largely be unsurprising to most that the challenges our professional pest management businesses have faced since the pandemic began can be largely grouped into four key categories, these being:

1. Ensuring our industry was recognised and classified as an essential service,
2. The logistics and complexities of continuing to operate during COVID-related lockdowns and curfews,
3. Securing our supplies of Personal Protective Equipment ('PPE') so we could safely undertake our services, and,
4. Managing the challenge of cancellations and deferrals. Within these challenges, it is nonetheless worth exploring some of the major trends or themes that have become apparent.

Pest Management as an Essential Service

Fundamentally, the professional pest management industry has been in the fortunate position of being recognised and classified as an 'essential service' in jurisdictions across the Asia Pacific and China regions. This has allowed most businesses to continue operating throughout the pandemic, albeit still facing the vagaries of COVID-related lockdowns and lost work as a result of customers closing or going out of business.

What this period has taught us though is the importance of pest management associations in being the 'voice' of the industry in ensuring the value and importance of our services was considered as various Governments made the (often arbitrary) decision as to what industries were regarded as being 'essential'. In this respect the ability for professional pest management associations to take the lead with lobbying and advocacy meant that a balanced and informed

argument could be made on our behalf, thus ensuring the best outcome for the whole industry and not one segment (e.g., commercial versus residential).

The second aspect associated with the challenge of being recognised as an essential service has been simply the uncertainty created as a result of Governments typically taking several days or more to publicly endorse what industries were formally 'essential'. During this period, customers would often refuse, defer, or turn-away services, and the ability of our service teams to freely move around a city or region was impacted if lockdowns had come into effect. Fundamentally though, these delays were often short-lived, and through the collective engagement of the industry and our Associations the decision from Government was normally shared very quickly (sometimes within minutes of the announcement being published).

Operating During Lockdowns and Curfews

As mentioned previously, one of the more practical challenges of the COVID-19 pandemic has been how businesses can continue to operate whilst Governments implement lockdowns and curfews in order to manage the spread of the virus. From an Australian (and Victorian perspective – the State where I live), this became most evident as Victoria and metropolitan Melbourne began to experience its 'second wave' during late June and early July. In response to rising cases across the state, two things happened: firstly, other States and Territories all restricted or prohibited travel across the border, with this cascading into a generalised border lockdown across virtually the entire Nation, and secondly, the Victorian Government also implemented a 'ring of steel' travel restriction enforced by roadblocks between metropolitan Melbourne and regional areas.

In the first instance, these restrictions meant that technicians that had to cross state borders (for example those living and working on the Queensland and New South Wales border, or the Victoria and New South Wales border) suddenly could no longer access and service their normal route and customers on the other side of the border. In some instances, these restrictions were only temporary, as Governments gradually began to implement permits for those living and working in the cross-border zone, but in some cases it has meant longer-term rearrangement of routes and support from different areas of a State for many of the those customers to continue receiving their service(s). In the second scenario, restrictions on travel between regional and metropolitan areas also meant permits had to be obtained, and services pre-booked well in advance for the customer to be prepared to receive the technician. Night-time curfews further complicated the logistics of meeting our service commitments, and sometimes required an additional and separate permit for work to go unhindered.

Fundamentally, though, what all these border and regional restrictions and curfews had in common was the complexity of doing business (with the requirement one or more permits) and the delays caused by waiting in queues to pass through various checkpoints. In many instances, Governments were slow to implement permit systems, their application process was often overwhelmed upon launch, and the conditions required to obtain a permit regularly changed depending on the severity of the virus outbreak. And in severe instances, technicians were caught for several hours in queues of traffic waiting to pass through a checkpoint. When cumulatively considered over a normal day, week, or month, a significant amount of time was lost in simply travelling a normal route, with this in turn placing enormous pressure on meeting all the contracted service visits for a month. Fortunately, Governments have largely improved their permit processes, and enhanced their methods of roadside checks, and for at least the last few months it has been easier to operate. However, with the vagaries of the current pandemic, it cannot be assumed that such restrictions will not become an issue again.

Finally, another factor often overlooked with these lockdowns and border restrictions has been the difficulty of supporting customers with Sales and Technical opportunities or issues. These team members have been similarly impacted, and if a customer is experiencing a pest issue requiring technical support, ensuring the appropriate team member is available has been more complex that normal. As expected, virtual meetings have become the norm, but the value of having direct eyes on the ground or expertise in the room is an aspect of our industry that should not be underestimated.

Provision of Personal Protective Equipment

The challenges to the provision of Personal Protective Equipment ('PPE') has undeniably been an issue that I believe all countries and companies have been acutely aware of, particularly during the earlier phase of the pandemic in March, April and May. Again, it is perhaps not unsurprising that items of PPE such as face masks, face shields, and disposable gloves suddenly experienced unprecedented demand and ensuring these essential items continued to be available for our field service technicians was a significant challenge for a brief period. In many respects, the issue of supply barely needs to be discussed in this article.

However, two other aspects associated with this issue are also worth nothing, with these being the proliferation of inferior quality alternatives and customers setting unnecessarily strict requirements for accessing their site(s).

In the first instance, from an Australian perspective, as supply became constrained poor-quality versions of the equipment we would normally use began to appear on the market. This complicated supply as, when dealing with insecticides and pesticides, the highest standard of protection is required and must be expected. In my own experience I was, at one point in early in the pandemic, supplied with a sample of masks that upon a quick search of the internet had been tested by the U.S. Centres for Disease Control and Prevention and found to provide as little as 16% filtering efficacy. Thankfully, such inferior stock has been targeted by our regulatory bodies and is now the exception to the rule, but it should still be considered by those in the field and called out if inferior options have been supplied.

Finally, one aspect that was perhaps as frustrating for our field service teams than the supply of PPE itself was with customers setting unnecessary standards as a requirement for access to the site. In one such instance our technicians were required to wear a respirator – at all times – even when conducting low-risk tasks such as cockroach gel baiting and rodent baiting. This had two negative consequences, with limited stocks of respirator cartridges being wasted, and it effectively doing nothing for the prevention of the spread of COVID-19. Instead, a better site access requirement would simply have been for all people on site, including both employees and contractors, to be required to wear a disposable face mask. Thankfully, we have generally seen such responses from customers being moderated, although some very sensitive sites (such as aged care facilities) still have strict – albeit warranted – site access requirements that might include rigorous PPE use.

Cancellations and Deferrals

One final aspect to the challenges of the COVID-19 pandemic is another that perhaps largely requires little mention or analysis – that being customer-initiated cancellations and deferrals. All businesses will have being impacted to some extent this year, with the degree of that impact largely subject to the vagaries of which market segments our businesses specialise in. Even those with a largely diversified base can be impacted if that diversified base is unevenly affected (e.g. imagine a business that does residential, hotels, and full-service restaurants).

As we would all understand, the pandemic has been (quite frankly) brutal in its impact across a wide variety of industries, but with the hardest hit being those involved in hospitality (e.g. restaurants) and lodging (hotels). Even the best analysis suggests that these segments will take many years to recover and are intricately linked to the recovery in tourism, business travel, discretionary spending, consumer sentiment, and the business districts of cities being reoccupied. With the world in recession, and possibly depression, the survival of businesses in these industries will rely largely on how well their respective Government manages the pandemic (with it unsurprisingly being those countries that have mishandled the pandemic experiencing the hardest economic hit).

And so it is at this time that perhaps the best thing we can do as an industry is to understand how best we can support our customers during this period. In many instances, zealously enforcing contracted service frequencies and pest coverage is largely ineffective and undoubtedly degrades good-will with the customer. Instead, a risk-based approach should again be the foundation of our relationship with the customer and we should be at-the-ready with information that is timely, relevant, and targeted in helping them understand the importance of pest management as they navigate in- and out- of (and potentially 'in-again')

pandemic-related shutdowns. Do they need their cockroach treatment every month while in limited operation or even shut down? Have they had any fly issues if they've been closed for 2 months? Do they need someone to flush the drains (more on this later)? These are hard topics for a business to contemplate, but if it helps a customer remain in business then the long-term benefit should be considered. They may, in turn, lead to other business opportunities.

Opportunities

Whilst the challenges of the COVID-19 pandemic have deservedly received most of the attention, it is worth considering that the pandemic, and business responses to it, will undoubtedly also create opportunities. Ultimately, some of these opportunities will be more apparent than others, and may not be applicable to all segments that professional pest management covers. As with the challenges, I would break them down into three main themes, these being: 1. Services for business entering or in shutdown or limited operation, 2. Sanitising or disinfection services, and 3. Services for businesses that are re-opening or that have experienced a pest infestation whilst closed.

Shutdown Services

As noted earlier in this document, one of our challenges as a pest management provider during this period is to how we can best respond to our customers' needs during this period - and whilst in might sound illogical, supporting our customers as they prepare to go into shutdown or a period of limited operation is a prime time for this and an area Ecolab had some success as the world experienced the first pandemic wave.

This mostly affects the hospitality and restaurant segment, but it would be fair to say that as these businesses have prepared for shutdown (often only with a few days' notice) pest management is rarely on their list of things to do. However, the 'right service' at the 'right time' can provide long-lasting protection for a facility and potentially prevent a pest infestation that might develop whilst the business is unattended. In many respects, the need for the service comes down to timing, and getting information to the customer that is highly relevant to them in a time-efficient and targeted manner. There is often only a very short window of opportunity, and thus the flexibility of the professional pest management business to cater to the customer's needs is also critical. And to rely on an old maxim – whether it's a rapid service, or bringing forward their normally contracted service, or simply doubling up some rodent bait and cockroach gel – something is better than nothing. A good Marketing function within the business is highly valuable for these types of activities as they can understand the market trends and quickly leverage the right technical content so that the customer knows that they have options available to them.

The other aspect to be considered is whether the customer can accommodate some services during their period of shutdown or limited operation. Again, this will vary significantly between market segments, and even customer to customer, but the ability to offer some form of pest management protection during this period is invaluable.
As noted above, the challenge rests with the professional pest management business to offer services that provide the maximum value to the customer during this time, and to adhere to the customer's site access requirements no matter how strict. Tasks that might seem peripheral to our normal service offering, like flushing drains or checking bins have been emptied, might make the difference between a booked service and a deferred service, particularly if combined with favourable payment terms or other incentives to confirm the service.

Sanitising / Disinfection Services

Another area that has received significant attention during the pandemic has been sanitising or disinfection services (*note: sanitising and disinfection can have different meanings or claims in various parts of the world; hence both are used in this article*). Many companies, including Ecolab, have offered in these services in some countries primarily in response to massively heightened customer demand and professional pest managers being perceived as well-equipped to apply sanitisers and disinfectants. Naturally, interest in this service peaked during the first wave from March and some professional pest management business will have seen these services as an opportunity to offset losses from cancellation and service deferrals. In that respect, this was a

good business opportunity to pursue, and was an obvious opportunity to again engage with our customers on a 'value-adding' service that we could provide during an extremely disrupted time. As a result, some countries and regions have had good success in offering this service, either through a regular service option or (more often) offering it as option for businesses that are re-opening from a period of shutdown or limited operation.

However, whilst I fully support a business's choice to offer these services, caution had to be given at the time as to reason why people were requesting such services and whether, in reality, they were likely to have any positive effect. Fundamentally, it was disappointing to see that many instances within the industry could be found where such a precautionary approach was not heeded, a fact which does not reflect on us well. The assumption that professional pest managers are the most appropriately skilled at conducted these services needs to be challenged, along with our industry's knowledge of how to prepare for and act within a potentially highly infectious environment. Compounding this were some, at the time, ambiguous claims being made as to efficacy against the SARS-CoV-2 virus at a time when no product had been tested against the virus, and some dubious application methods (such as ULV misting and thermal fogging) being chosen for products never intended to be applied as such.

Of course, the reason for these concerns was that society was in many instances behaving irrationally and likely devolving to a base approach of dousing everything with sanitiser or disinfectant would solve the virus challenge. This is perhaps best exemplified through the proliferation of sanitiser / disinfection tunnels in shopping malls and airports, and large-scale parades of sanitiser and disinfectant application from roving government workforces. Did any of these have any impact on the spread of the virus – well, probably not.[1]

Fundamentally, I would argue that our industry would have been better served taking an educative role and deferring the public health experts on what an appropriate sanitising or disinfection service consisted of. In a similar vein, the professional pest management Associations should have taken a far more proactive approach to this practice and been similarly aggressive in defining 'Best Practice' with input from our public health departments. To a degree, some of that advice came too-little, too-late.

As to the future of disinfection treatments? I suspect they are here to stay, but at a significantly reduce level of demand. Many customers, particularly those in the hospitality and lodging segments, have likely sought their own expert advice and now understand that 'COVID-safe' treatments can be done with many of the cleaning chemicals that had on-hand already. Nonetheless, some countries and regions will likely see some sales well into 2021, and possibly beyond, depending on both customer demand following shutdowns or the country's general handling of the pandemic as a whole.

Re-opening Services / Increased Pest Activity

A final opportunity that perhaps wasn't grasped as fully as it could have been are services and treatments for businesses that are re-opening from a shutdown.

Initially, some of the expectation for these types of services was based on an assumption that these businesses would be experiencing significant pest activity – but the evidence to date would suggest that such claims to be largely overblown. Instead, these services should instead have been about returning a premise to a 'safe-food' standard. For those companies involved, it could be combined with a sanitising / disinfection treatment, but care had to be taken again such that the positive effects of an insecticide treatment were not negated by a disinfectant or sanitiser treatment, thus a planned timeline had to be agreed to by the customer. Similarly, if the business is re-opening but facing capacity and operational limits, then the same flexibility and responsiveness is warranted as with the time when the business was at the commencement of a shutdown. As stated previously – something is better than nothing.

Of course, one of the initial reasons for being interested in offering these services is because of a pervading view during the first and second waves of the pandemic that pest activity would explode. Many articles could be found, usually in reference to rodents, espousing the fact that their populations would thrive during the pandemic[2], that they were invading the streets, and that they would imminently spread to the suburbs[3]. Perhaps unfortunately for our industry, very little

of the this eventuated (an opportunity lost?) – at least not within much of the Asia Pacific region. Not unsurprisingly, as an industry we should have perhaps looked for the less popular opinion offered by a few – Dr Bobby Corrigan being one of note – who correctly deduced that what we were seeing with rodents was not a surge in their population, but rather pre-existing infestations that were hungry, stressed, and therefore foraging more publicly for suddenly limited resources[4]. In many respects, they should have been easier infestations to eliminate and which instead reinforced the importance of the timely, targeted and relevant information that was provided to our customers earlier in the pandemic, particularly around what to look for that might have indicated a pest issue.

Of course, there are exceptions, but again it is probably one that most businesses missed. Based on a survey within our business, the number one issue faced by customers re-opening from a period of shutdown or limited services? American cockroaches. And the primary reason for this – no one flushed the drains. Over several weeks or months, these dried out, and enabled easy access from the sewers below. Thus, from my perspective, when the next pandemic (or COVID-19 wave) comes, put down the sanitiser and instead pick up a bucket of warm, soapy water. Your customers will thank you for it. ■

This article is a summary of Dr David Lilly's presentation given at the FAOPMA-Pest Summit 2020 Virtual Conference.

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Marketing in Times of COVID-19

Getting the message out to potential clients has never been harder

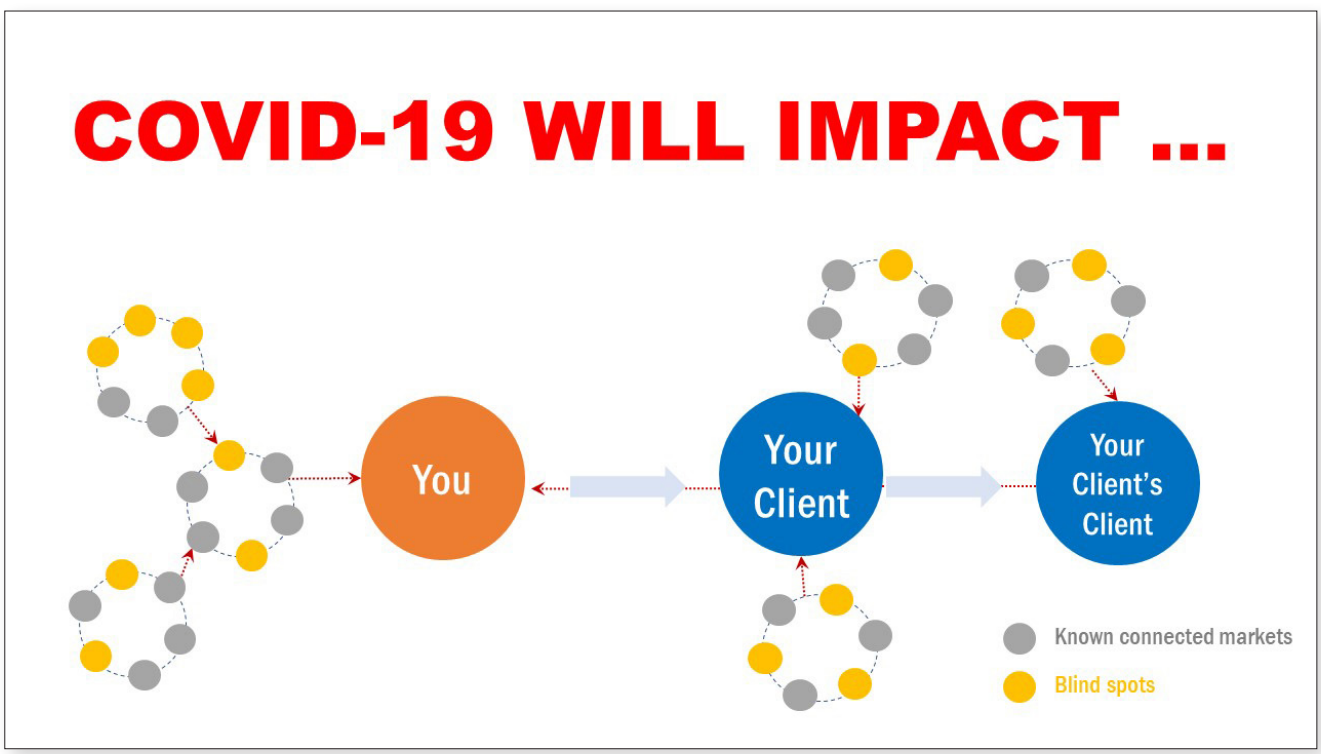
Viren Merchant

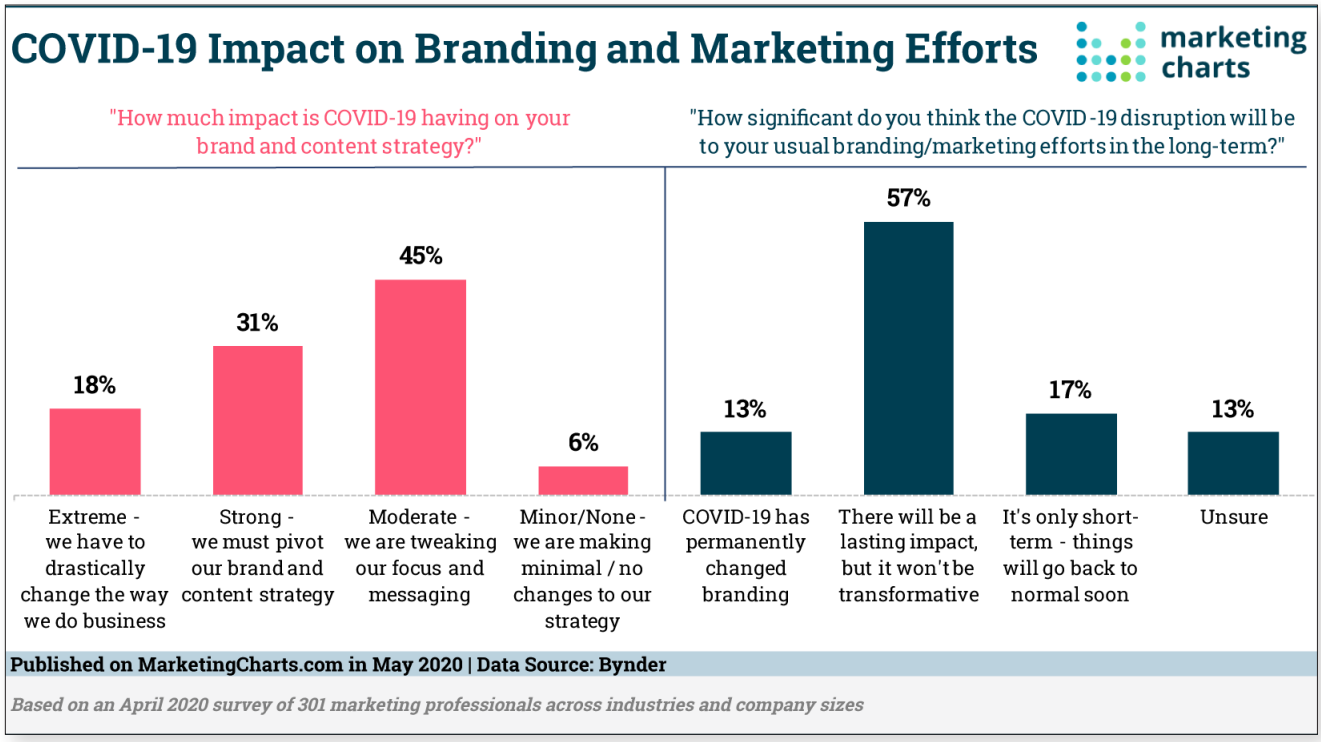
Introspection …. Yes & Not an Introduction!

The COVID-19 pandemic is a health crisis like we have never seen before and thus it is no surprise that it came with disruptions to business.

This pandemic has certainly had an impact on the way IPM business is conducted. This is new for everyone on the planet! Several businesses are shutting up shops and economies have moved downward. Liquidity and cash flows have been restrained and growth plans have been derailed in the current times.

Therefore, it is important to *Stop, Relax, and Not Panic*, whilst preparing a marketing strategy to propel your organization forward! This is a time to gain perspective in order to strategize effectively.





Perspectives on the COVID19 Impact on Marketing

Several marketing surveys have pointed out a deep impact on marketing spends across industries along with changing consumer spending trends. It is important to monitor the prevailing market conditions. Check, for example, the graph above published by www.MarketingCharts.com in May 2020.

There are concerns with consumer discretionary sectors, i.e. non-essentials, where spending can be avoided by consumers. However, going forward there are positives expected with value based Content Marketing.

Reanalyze Your Marketing Plan with COVID-19 in Mind

In times like these, one needs to respond to changes in real time. We are all learning and there is no silver bullet…yet!

Such times should trigger the leader to first step back, reevaluate one's plans, re-centre their thinking, and focus on what is next. Currently, keeping one's business in front of consumers could help with their perception of your brand, even if they are not buying it right now. Leading global economies including European and the USA are predicted to take the next three years to recover from this crisis. Similar concerns hold for the Asia-Pacific economies as well.

Quote: *"People do not buy goods and services. They buy Relations, Stories and Magic"*, by Seth Godin.

Have a strategy based on your spending capacity in the current times. It is imperative to keep a track of the revenue and assess all fixed and variable expenses whilst approaching marketing budgets.

Focus should be less on conversion rates for sales, and rather focusing on brand presence methods. There is a necessity for strategies to change with the times. It is time to shift with the trends and adapt to newer means of communication. Do not be keen to only sell, but rather, to listen and reciprocate with your audience. Good digital marketing strategy is cost-effective option, particularly in the current situation.

The global economy has turned into a digital marketplace. Take for example, India's Internet consumption, which rose by 13% during the lockdown. A similar effect has been observed in other countries. Going digital and marketing online is the way forward in these present times.

Post COVID-19 Marketing Strategies

Good marketing, at its core, has to include a deep understanding of your target market, which includes knowing:

- their day-to-day lives,
- their challenges,
- their joys,
- their perspective on the world around them.

Once you understand that, and take into consideration the current circumstances, one can figure out how one's brand fits into that story. Many of those things you knew about your target audience/clients, are different now. The other challenge is that there is no manual for this.

Consumer Centric and Present Situation Sensitive Approach to Marketing

Listen to what consumers need or want! Maintaining a connection with your consumers will help build a trustworthy relationship that will be rewarding. Share content that is engaging and

relatable in these times to sustain the connection. This will help gain share ability and also garner consumer interaction. Content marketing is all about answering your customers' questions.

Understand the consumers' pressure points, ask for genuine feedback on your service, and develop knowledge of what they are looking for when they turn to your brand. This will help consolidate your marketing strategy.

Marketing Strategy and Tools

It is important to have clarity between Marketing Strategy and Tools, including knowing the difference between the two, and effectively integrating your strategy based on geographic situations (i.e. local factors).

Tools of marketing may be similar across geographies, but the Strategy has to be specific and customized based on local parameters.

Content Marketing is about investing more in educating and creating awareness amongst customers and the target audience. This helps to connect with customers and build healthy sustainable relations.

It is time to pivot! Craft a message that is sensitive to the current situation, takes into account your customer new situations and concerns, and is honest, transparent, and human (i.e. not pushy).

Take for example this advertisement below by Nike. This Nike advertisement is truly a Gold Standard. It is human and inspiring. It aligns with the defining spirit or mood of the current times of the pandemic. The simple, black-and-white creative adds to the gravitas (with dignity and seriousness) of the message without having a negative undertone. Instead, it has an underlying tone of hope and optimism. Have a positive mindset, but do not be insensitive.

Tools of Marketing to Consider

Consider developing a learning centre kind of digital platform, endowed with information, publications, webinars, and other information. Hold virtual events that focus on value based knowledge sharing with the target audience and clients, and ensure that there is a clear message for the attendee to takeaway. Use social media effectively, both the free and paid options, as they have good return on investments and at reasonable costs.

Effectively use SEO (search engine optimization), generate niche subject demand relevant to current times, for example, disinfection, public health, and IPM. There are sites and directories,

where you can go and place links for free.

Social media is a wildcard on a good day, so tread carefully, but tread you must! Do you have an established presence on social channels? Then utilize it! Responsibly take advantage of all your organic opportunities.

Around 65% of small-to-midsized businesses (SMBs) invest in pay-per-click (PPC) advertisement. Google Ads is also a wonderful marketing tool (keywords) and offers an impressive return on investment.

Marketing on radio is a good option too. Worldwide radio advertising contribute to almost 10% of total marketing spend, as it is recognized for its reasonable cost, and very good audience reach and penetration.

It is no secret that quality customer communication is an essential step to retaining the customers. There is a fine art to this communication, and one of the definitive aspects is email marketing. It has been in use for a long time and has reaped rewards for companies that effectively use it as a marketing tool.

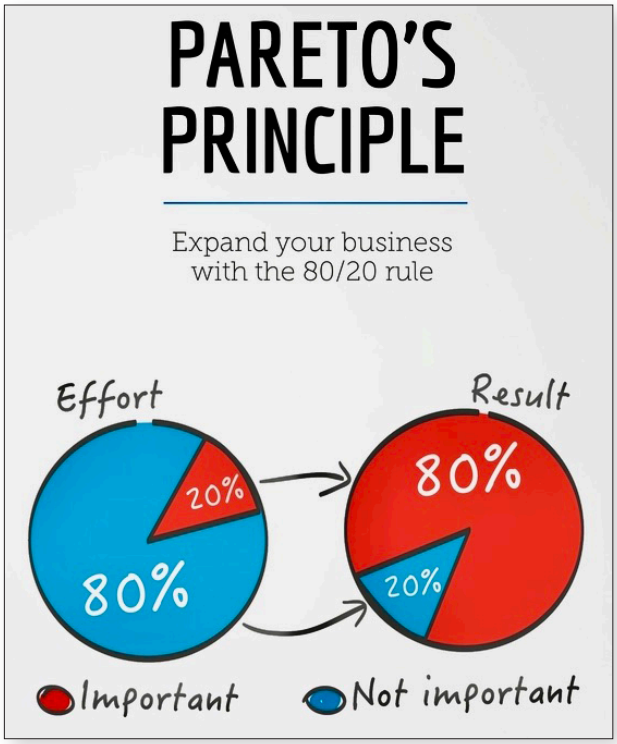
Facebook Ads is another tool to consider due to its vast network, incredible popularity, and flexible budgeting.

One can consider the range of online tools available globally and locally in their countries, and the strategies to integrate the use of these options.

Pareto's Principle

This principle can be an effective guideline to implement in one's marketing strategy for their organization. The Pareto Principle, named after esteemed economist Vilfredo Pareto, specifies that 80% of consequences come from 20% of the causes, asserting an unequal relationship between inputs and outputs. This principle serves as a general reminder that the relationship between inputs and outputs is not balanced.

Therefore, one can retain and grow one's loyal customer base during these pandemic times utilizing the Pareto's Principle as strategy. Analyze and focus on your core revenue generating clientele base, which may be a smaller portion of the total client pie. Leverage this data to maximize



your specific customer engagements in these times through resource optimization and the right communication.

Conclusion

Marketing in the conditions imposed on us by the coronavirus pandemic must lean on community, brand building, and relationships with existing customers.

If one can strike the right tone with their messaging, and that message resonates in the consciousness of the target audience, ones business will be in a good position to retain the market share or even gain as the economic activity normalizes and improves in the region.

To emerge winners in this crisis, one must combine resilience and agility in your strategy. You must determine where you should be strong and where to be flexible, keeping the target audience in your mind at all times. ■

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

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Monitoring for Stored Product Pests during COVID-19

Pheremones are key attractants for many pests

Rikiya Sasaki

In 2020, human activities were restricted by the COVID-19 pandemic. Production activity and the manufacturing of products were temporarily suspended under lockdown. However, COVID-19 has had little to no influence on pest activity. In fact, pest activity was often higher, because of the absence of people in factories and warehouses. Anecdotally, I have heard that the number of stored product insects increased in some factories during the lockdown.

Why would the number of stored product insects increase? Because there is dust that can be used as food in a factory. Locations where dust is apt to collect may become the infestation sources. Dust is normally removed by regular cleaning, however there was often not enough time for cleaning prior to the lockdown. The dust may be left in a site for a long time, becoming the source for the infestation. What should we do to monitor for these pests during an unusual situation like COVID-19? Monitoring by pheromone traps are the usual pest management recommendation.

I'd like to think about pest control during COVID-19. Is there anything different between pest control before the pandemic and pest control during the COVID-19 pandemic? Let's begin with stored product insects, our targets.

Stored Product Insects

The main target of the topic in this article is stored product insects. They are defined as insects that attack intact seeds and commodities with low water content. They are divided into two groups by order of infestation: primary and secondary pests. Primary pests infest grains such as wheat and rice. Secondary pests infest milled products such as flour, and processed and manufactured food products. Maize and rice weevils are primary pests. The Indian meal moth, the red/confused flour beetle, and the saw-toothed grain beetle, are all secondary pests. The tobacco/drugstore beetle are both primary and secondary pests.

Both primary and secondary pests cause two forms of damage; the loss of raw materials as the pests consume the product and the contamination of the products with the insects. The early detection of an infestation is important for the prevention of damage of the stored product. Monitoring is an efficient way for early detection and a key component for pest control by Integrated Pest Management (IPM).

Pheromone Traps

Pheromone traps are one form of monitoring tool. A pheromone trap consists of two parts, a lure and a trap. The lure contains attractants to target the pests. Attractants are usually pheromones and sometimes kairomones. Pheromones are defined as a chemical substance that insects produce and emit from their body. Insects release pheromones to communicate with their own species – it is essentially their form of language. A kairomone is an odour from their food. The trap generally consists of a cardboard coated with an adhesive, sticky substance. As pheromones are species-specific, they will only attract the targeted pest. It is important to note that pheromone traps are only for monitoring use and not for direct control. Typically most only collect males and it is not possible to catch all males. Moreover, males can generally copulate multiple times and even a considerable catch of males may not lead to population reduction of the pest.

The Role of Pheromone Traps in Monitoring

In light of these limitations, what then is the role of the pheromone trap? Pheromone traps catch the target species within a certain effective range. By counting the number of insects captured we obtain a numerical value. Data from obscure infestations can be converted into concrete values through pheromone traps, thus a pheromone trap becomes a simple device for digitization. It is somewhat like a thermometer, which converts our body temperature into a numerical value.

Digitization is important for pest control with IPM. By digitization, visualization is possible. The situation of an infestation is more objectively shared by visualization. This is the first step of pest management.

Seasonal prevalence of catches and distribution maps of infestations are very typical examples of visualization. We grasp population density through the prevalence of catches and can estimate the timing of occurrence. From a map, we can identify the distribution of an infestation at a glance. We can determine when pest populations become significant, where they are occurring, and share the results easily.

Information accumulated from a distribution map of an infestation is especially helpful for pest management during COVID-19. We are able to recognize locations with potential risks of an infestation. In other words, we can focus on high risk areas to implement control measures more intensively. Thus, use time more efficiently, which is normally limited before a lockdown commences.

We conduct pest management based on information obtained from pheromone traps. However, reliable data and correct information can only come from the proper use of pheromone traps. Thus it is necessary to check product specifications and directions for use before employing a pheromone trap.

Recommended Usage of NEW SERRICO

The specification and directions for the NEW SERRICO pheromone trap for monitoring the tobacco beetle, based on experimental research, are as follows:

- Shelf life is one year, when kept in cool, dark conditions, and in the original packaging.
- A lure will last for one month once it has been taken out of the packaging.
- They should be installed at 10 metre intervals and at a height of 1.5 meters on a wall or a pillar.

Figure 1 is the relationship between storage period and performance. Performance is an efficacy value relative to the zero month. Zero month refers to a time within one week after the trap was produced. Performance was maintained over a value of 0.8, making the shelf life being one year.

Figure 2 is the relationship between use period and performance. Performance remained constant for six weeks, however, we recommend that they are used only for up to one month. The reason for this was that the experiments undertaken in our laboratory were done so under stable environmental conditions. In contrast, conditions in a site, factory, or a warehouse, may

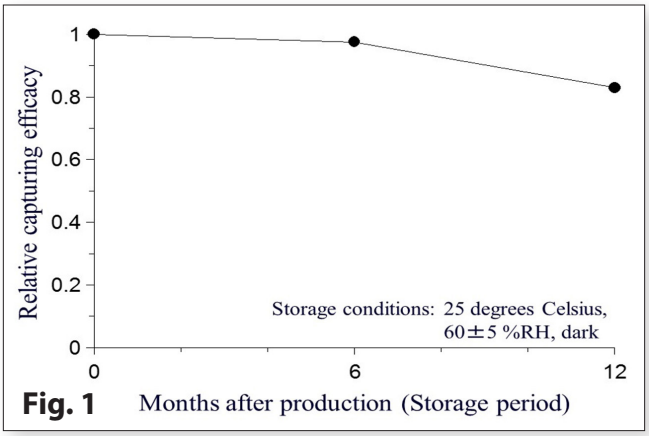

Fig. 1

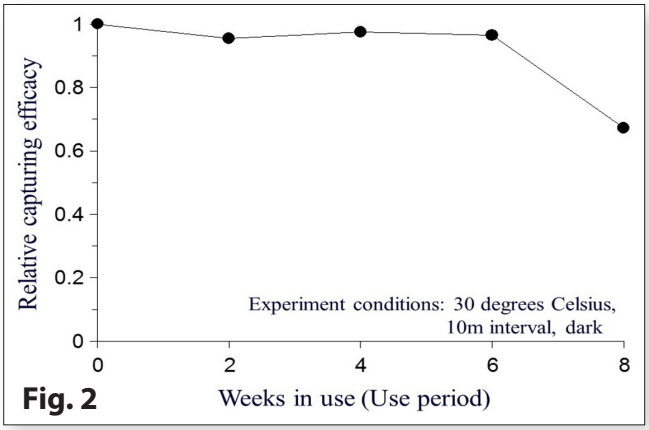

Fig. 2

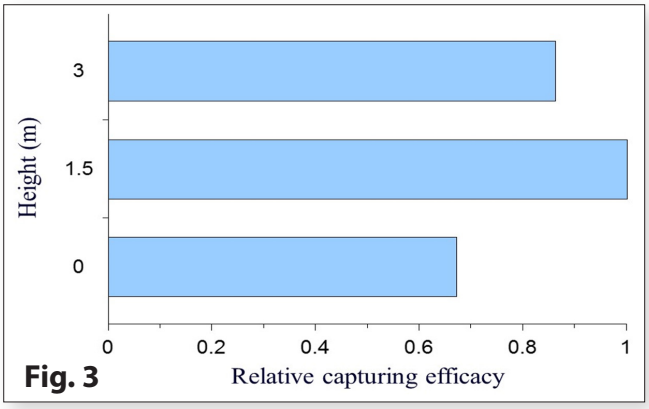

Fig. 3

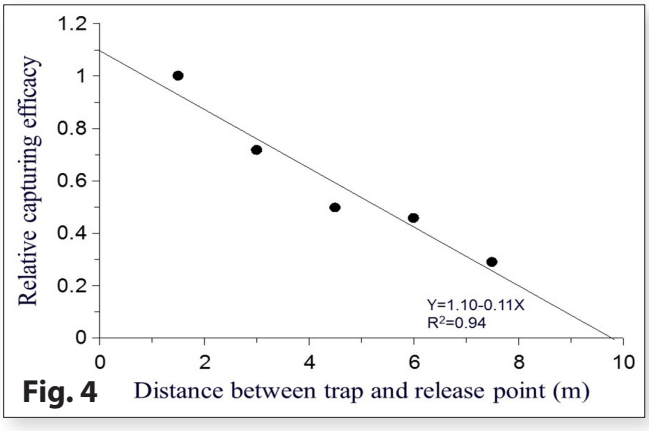

Fig. 4

fluctuate considerably. Thus we recommend that pheromone traps are used for up to one month in a site where environmental conditions constantly change.

Figure 3 is the relationship between heights that traps are placed, with their performance. At zero height, a trap was placed against a wall. Performance was not constant, although there was no significant difference between three traps at this height. Thus we recommend 1.5 metres as installation height for a trap. The height is nearly equal to eye-level, thus it is easy to check the traps and to count the number of catches.

Figure 4 is the relationship between distance and performance. A trap was placed at 1.5 metres height on a wall. Performance decreased linearly with distance, to half at five metres and to zero at around ten metres. So, we conclude that the effective range is five meters and recommend that ten metres intervals are used between traps at a site.

Pheromone traps continue to work once installed at a site and there is no need for a power supply. Thus they can still function even during a power cut. Pheromone traps are also very easy-to-use for monitoring.

Monitoring by pheromone trap enables the following three points:

1. The early detection of an infestation,
2. The obtaining of information pertaining to the insect occurrence,
3. The effectiveness of the treatments.

All of these points are essential in pest management. Moreover, these are all important aspects for a smooth response in an unusual situation, such as with a COVID-19 lockdown. Preparation in usual times will come in handy when the situation becomes unusual! ■

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

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Insect Baits and Baiting:

Stand alone tools to control urban pests

Partho Dhang

Introduction

Indoor pests have habituated themselves with human food and items around human vicinity, thus making use of insecticide baits have turned out to be most advantageous and effective. In fact, the singular reason for these pests to find harbourage in homes are for food and shelter. The concept of baiting has taken these two aspects and turned it into a practicable technique. A pest controller now provides a bait as food substitute, and bait stations as shelter to replicate both of the pest's needs. In addition, the reason for baiting becoming popular is its reduced risk and total safety aspect when used.

How Does Bait Reduces Risk?

Baits are safer as they make use of very little active ingredient in its formulation. The amount of active ingredient varies between 50mg to 2.0g per kg of bait. The application rates are also a few grams of formulated bait per square metre of the treatment area. This keeps both the application site and the applicator safe. In addition, most active ingredients used in insect baits are chosen to have low mammalian toxicity and are target specific. They are mostly not contact poisons and are mainly analogs and antagonists of insect growth regulators (IGR) such as juvenile hormone (JH), ecdysone, chitin synthesis inhibitors, and related compounds. Each of these generation compounds have low toxicity to mammals, or selective toxicity towards insects, thus making baits safe to handle safe. But there are instances where toxic active ingredients are also used in baits to give a quick killing effect. In such cases, the percentage of active used in the formulation is kept at a level, which is many times lower than conventional spraying.

Baits are target specific; baits made for one pest species rarely attracts another pest species. This prevents affecting non-target organisms. This is achieved by using pest specific attractants and stimulants. In addition, baits are always applied or placed in selective areas, or inside concealed bait stations, which prevents non-target organisms coming into contact with the bait. Both these two aspects lower the risk of baits when applied.

Baits work by a single process of ingestion, a precise act on the part of the pest, while conventional spraying requires the pest to come in contact with the chemical. To ensure that the pests come into contact with the baits, the baits need to be selectively placed, whereas for spraying the entire area needs to be treated. Thus the amount of active ingredient used in baits can be very small compared to conventional spraying to achieve the desired result (Table 1).

Table 1. Comparative amount of active ingredient used in conventional spraying compared with gel baiting to eliminate German cockroaches, *Blatella germanica,* in a 250m² kitchen (Dhang 2018, unpublished work).

Treatment type	Total duration taken to totally eliminate of *Blattella germanica* population in a 250m² kitchen	Amount of active ingredient used
Conventional spraying using a Deltamethrin SC formulation	90 days	12.0 g
Gel Baiting using a Fipronil based Gel bait	60 days	0.075 g

What Makes Bait Work?

Baits developed for insect pests are food based. They are not only effective in killing the insect directly through ingestion by the feeding individual but also show a killing effect on individuals that do not ingest the bait directly. The process termed "transfer effect or secondary effect" further enhances the efficacy of the bait against insects that are social or live in groups and exhibit trophollaxis (transfer food via mouth to mouth) or proctodeal (anus to mouth) feeding. Cockroaches are not social insects but live in groups thus baits work well with them. Cockroaches have shown horizontal transfer of insecticides contained in baits. There is considerable research to demonstrate this fact (Kopanic and Schal 1997; Buczkowski *et al.*, 2001). The process of secondary kill takes effect due the presence of unmetabolized slow acting insecticide in the bait formulation, in the feces, or oral secretions, or it may simply remains in the body of the dead cockroaches. By the process of coprophagy (eating faeces) and necrophagy (eating the dead), the left-over insecticide is then taken up by other individuals, which brings about the secondary kills. Transfer effects or secondary kills increases the overall control efficacy of the bait; however, the efficiency of the secondary kill can be dependent on the active ingredient and other influencing factors such as developmental stage of the pest, the strain, and donor/recipient ratio (Wang *et al.*, 2008).

In one study, the researchers Bayer and colleagues (2012) showed that cockroaches in fact consumed more active ingredient than needed to cause mortality from a bait, proving no bait shyness. The same work also estimated that a 30g tube of gel bait potentially killed from 394 to 6,966 adult cockroaches, depending on the species. Mortality for all cockroach species was faster for adults (≥3 days), than for nymphs (≥7 days).

Similar successful bait transfer from one individual to other in the field has been shown in controlling all forms of social insect pests such as ants, termites, and feral wasps.

Are Baits Advantageous over Conventional Sprays?

It remains an unchallenged fact that conventional methods of pest control have eased the urban life of humans, but it has also brought enormous damage to our health and the environment. Conventional methods of pest control can cover a wide range of pests, provide quick and easy elimination, and have long field persistence as key benefits. Conventional methods depends on the use of pesticides as a single approach to pest control in which the chemical provides significant or acceptable reduction in pest population. It involves a single

action of chemical application following some regular, predetermined spray schedule. However, modern pest management is more than eliminating pests. It involves maintaining control over the pest, preventing re-infestations, and reducing chemical use as more important than mere killing (Dhang, 2011).

Baits have provided a rational solution to all the above, in addition to being able to control cryptic pests, and allows for the treatment of inaccessible and sensitive areas. In addition, baits offer no odour, no translocation, and no staining potential, which are common household concerns. Baits also leave lower or no residues. Furthermore, baiting is most suitable for treating sensitive locations such as high-density human populations, food preparation areas, inside hospitals and schools.

It is another aspect, such as the cost of services and overall efficacy, which make baits advantageous over conventional sprays. A World Health Organization publication provide some insight into this (Rust, 2008). It was reported in one instance that the cost for a conventional service for cockroach control was USD$8.57 per unit and IPM was USD$7.49 per unit. In another study, the costs for IPM involving monitoring, baiting, cleaning and structural repairs, were USD$46–69 per unit in the first year and USD$24 per unit in the following year. In comparison, conventional chemical controls costed USD$24–46 per unit, and involved no repairs or structural modifications to the apartments. In another study in public housing, the costs of conventional crack-and-crevice treatments with sprays and dusts were compared with vacuuming, baits and insect growth regulators (IGRs) for controlling German cockroaches. The average costs for IPM and conventional

treatments were USD$4.06 and USD$1.50 per unit, respectively. After eight months, cockroach populations decreased around 80% in IPM units, compared with a 300% increase with conventional treatments.

What are the Methodologies Involved in Baiting?

Compared to conventional spray treatments, baiting is inspection driven, kinder to the environment, and often more effective. Although the technology is restricted to a few pests, it has however made significant progress as a tool in urban pest management. However as discussed by Dhang (2011), the overall efficiency of baiting will depend on the bait applicators. Applicators' knowledge and skills are of paramount importance for baiting to be successful, as the concept of baiting is a dynamic field, constantly evolving, and adjusting to changes in insect behaviour and location. The human component involved in baiting is possibly the single factor against its popularity among pest control practitioners, which could be resolved through training.

The critical part of a typical baiting program depends on the following (Dhang, 2018):

- ***Quality of the bait***

  Commercial baits vary in attractability, nutritional quality, colour, texture, moisture, and many more factors that are critical determinants in acceptability and sustained feeding. Each bait needs to be tested before being used to ensure best performance.

- ***Technical skills and knowledge of the bait applicator***

  This is the second most important factor in bait performance. Good bait, with poor placement and the wrong dosage, can make bait ineffective. The greatest variant in any baiting program is the quantity of bait consumed. Knowledge on pest biology is usually required to overcome this issue.

- ***Pest population***

  It is never possible to determine the pest population based on a survey or inspection. Often the population of the pest determines the bait quantity, the number of visits, and ultimately the cost. This has to be taken note of before starting a baiting program.

- ***Harbourage location***

  Baits will only work if they are ingested, which is always a voluntary act. A pest will not walk the extra distance to seek a bait when food is around the harbourage. To

make baits competitive, it is thus important to either aggregate the pest in a specific location using a bait station or place the bait in the regular feeding zone near the harbourage.

- ***Sanitation of the area***

  Baits or a baiting program does not work well if the sanitation of the site is poor. Left over food or alternative food that is available in a site acts as direct competition to the bait. This results in a reduction of bait consumption and in turn turing ineffective in the elimination of the pest. Thus it is advisable to clean the site before baiting.

- ***Follow up and monitoring***

  One time bait application does not often work. Too much bait left may become dry or contaminated, and is not longer palatable to the pest. While too little bait will not kill all the individuals in the infestation. This makes a repeat visit or a monitoing trip a must. ■

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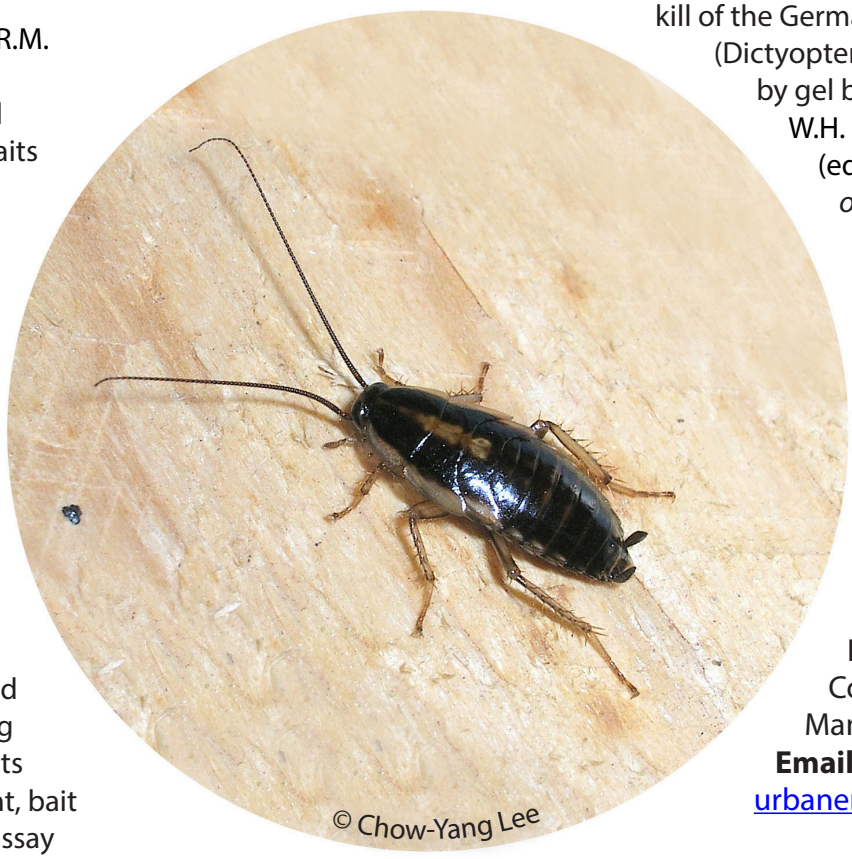

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TECH TALK - Insect Growth Regulators (Part II Chitin Synthesis Inhibtors)

An introduction to how IGRs function

Steve Broadbent

We previously discussed that there are two types of insect growth regulators used in the urban pest market, Juvenile Hormone Analogues (JHAs) and Chitin Synthesis Inhibitors (CSIs). In this issue, we will focus on the Chitin Synthesis Inhibitors.

Chitin Synthesis Inhibitors interfere with enzymes that stimulate the synthesis and formation of chitin, an essential structural component in the insect's exoskeleton. Without chitin, the insect dies in the immature stage, or grows into a sterile adult. This, combined with the ability of CSIs to stop normal embryonic (egg) development, makes them effective at all stages of an insect's life.

The cuticle, or outer exoskeleton, is the external structure of the insect. It needs to be waterproof for protection, soft and flexible to allow movement, extensible in between segments for increases during feeding and growth, and rigid to provide firm points of attachment for muscles, mandibles, and claws. The cuticle is secreted by a single underlying layer of epidermal cells and itself consists of different layers of which the thick *procuticle* contains *chitin*, the major component of the insect cuticle (30 – 60%). Technically, chitin is a β-1,4-linked aminopolysaccharide homopolymer of *N–acetylglucosamine* (GlcNAc), a glucose derivative. It is by far one of the most abundant biological materials on earth. Chitin is also present in the insect gut, trachea, reproductive tract and peritrophic matrix, where it also provides structural support.

> Chitin synthesis inhibitors stop the formation of chitin, an amino-polysaccharide compound needed in the insect's exoskeleton. Once affected, the insect will grow normally until it moults. It is then unable to form a new exoskeleton properly and dies. Death may be quick, or take up to several days, depending on the species and the nature of the IGR. Chitin synthesis inhibitors also disrupt the normal development of eggs.

The cuticle forms a protective matrix, consisting of a chitin microfiber–protein complex. Chitin biosynthesis is a multifaceted process, and not fully understood, but it seems to consist of a series of enzymatic steps beginning with a glucose molecule. This molecule is converted to N–acetylglucosamine, that then links with

uracil triphosphate (UTP) and dolichol phosphate. The resultant monomers are combined, through polymerisation, into chitin. This is then embedded within proteins to form chitin strands (microfibrils) in the cuticle. The entire process is catalysed by the enzyme *chitin synthase*.

CSIs generally alter cuticle composition by inhibiting the formation of the N–acetylglucosamine, leading to reduced levels of chitin in the cuticle. Cuticular elasticity and firmness are directly affected. The imperfections in the cuticle are most evident at moulting (ecdysis) and lead to abortive moulting. Several potential modes of action have been discussed, but most evidence points to inhibition of the chitin synthase enzyme.

The main CSI products in the market are all *benzyl phenyl urea* compounds (BPUs). They act mainly after ingestion, and are also effective as ovicides, reducing the egg-laying rate or inhibiting embryonic development. In most cases, the embryo fully develops, but the larvae fail to hatch.

The first Chitin Synthesis Inhibitor, *diflubenzuron*, was discovered by scientists at Philips-Duphar in the Netherlands. Diflubenzuron is widely used around the world as a public health insecticide, and in the United States and Europe in termite baits.

Within the FAOPMA regions, CSIs are mainly used in termite baits and dusts; these include hexaflumuron (Corteva), chlorfluazuron (Ensystex), bistrifluron (Sumitomo) and triflumuron (Bayer).

These products are particularly effective as termite baits. In addition to its effects on the termite at time of moult, chlorfluazuron also has a significant effect on the termite's peritrophic matrix. The peritrophic matrix is a semi-permeable, non-cellular structure which surrounds the food bolus in an insect's *mesenteron* (midgut). The peritrophic matrix serves several functions, including improvement of digestion, protection against mechanical and chemical damage and serves as a barrier to infection by pathogens. In all insects, the peritrophic matrix is continuously being synthesised, and excreted with the faecal matter.

The peritrophic membrane largely consists of γ-chitin. In termites the peritrophic matrix is a Type II single uniform layer synthesised by a group of cells in the front of the mesenteron.

Studies have shown significant damage to the peritrophic matrix of termites after ingestion of chlorfluazuron. Loss of the peritrophic matrix can have drastic consequences on the ability of termites to digest their food and resist disease. The lack of peritrophic matrix in actively feeding termite workers seems to contribute to the loss of epithelial cells in the inner mesenteron, probably caused by abrasion due to direct contact with wood particles. This may contribute to the premature death of termite workers by reducing food assimilation efficiency and inducing nutritional deficiency. This mechanism can also affect reproductive castes of termites by inducing nutritional deficiency, potentially affecting their reproductive capacity, tolerance to pathogens, and longevity.

The chitin synthesis inhibitory action of CSIs is generally quite specific towards insects. Related biochemical processes, such as chitin synthesis in fungi, and biosynthesis of hyaluronic acid and other mucopolysaccharides in chickens, mice, and rats, are not affected. CSIs do have varying degrees of effects on crustaceans, requiring that they be used with care around aquatic environments.

Another important feature of these compounds is that they are not degraded by insects, which further enhances their retention and longevity in the insect's system and consequent effectiveness.

And finally, what of the future for Insect Growth Regulators? One of the more exciting aspects of the IGR field is the likely discovery of new agents with novel sites of action on the insect integumental, endocrine or other biological systems. Such compounds hold out the hope of possessing even more properties of the ideal insecticide. ■

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WHO IS PEST POSSE?

Educating the pest management industry

Forster Brusca

According to The Pest Posse it is you… the pest control service technician and the small to medium-sized pest control business owner.

The idea of The Pest Posse was born when the founder, Culley Christensen, realized that younger pest control professionals were seeking out videos to watch about pest control rather than reading books that were provided to them. He also realized that people have different learning styles as well as that training can be presented in different ways. Being a pest management professional with over 20 years of experience, he knew the pest control industry was a visual industry, so he envisioned providing videos with accurate and timely information on pest control products, techniques, and ultimately ongoing training. In September 2017 Culley launched a weekly video series on YouTube that was dedicated just to pest management professionals. In December 2018, Culley brought on-board his long-time friend in the pest control industry, Foster Brusca. Culley knew that Foster's success, knowledge, and over 25 years of pest control experience would help The Pest Posse grow into what he initially envisioned.

With over 45 years of combined experience in the pest management industry, these two pest management professionals have built The Pest Posse into a trusted resource for training and information for the pest control industry. Their independent views and videos have started to have a reaching effect not only for the pest management professionals in the United States but for other countries as well.

In 2019, with The Pest Posse weekly video series increasing its reach and subscribers, the plug-n-play video-based training system called Pest Posse Academy was launched. This subscription-based training was developed to provide small to medium-sized pest management companies a consistent quality training program. This training system provides different video-based training courses each month so that way companies will have regular ongoing training curriculum. The curriculum keeps the pest management professional performing at their best by delivering courses on safety, pest identification, reading pesticide labels, specific application techniques, and the all-important soft skills that are needed to grow a business and retain customers.

The Pest Posse has brought the dawn of a new way of training and receiving information for the professional pest control industry.

Keep an eye for YouTube/Podcast episodes with the Chief Editor of the FAOPMA Magazine!

Pest Posse Academy: www.thepestposse.net/online-training

The Pest Posse YouTube series: www.youtube.com/c/ThePestPosse

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The voice of the Australian Professional Pest Management Industry

Biology and Management of the German Cockroach

Changlu Wang, Chow-Yang Lee, and Michael K. Rust (eds)

Book Review by Stephen L. Doggett

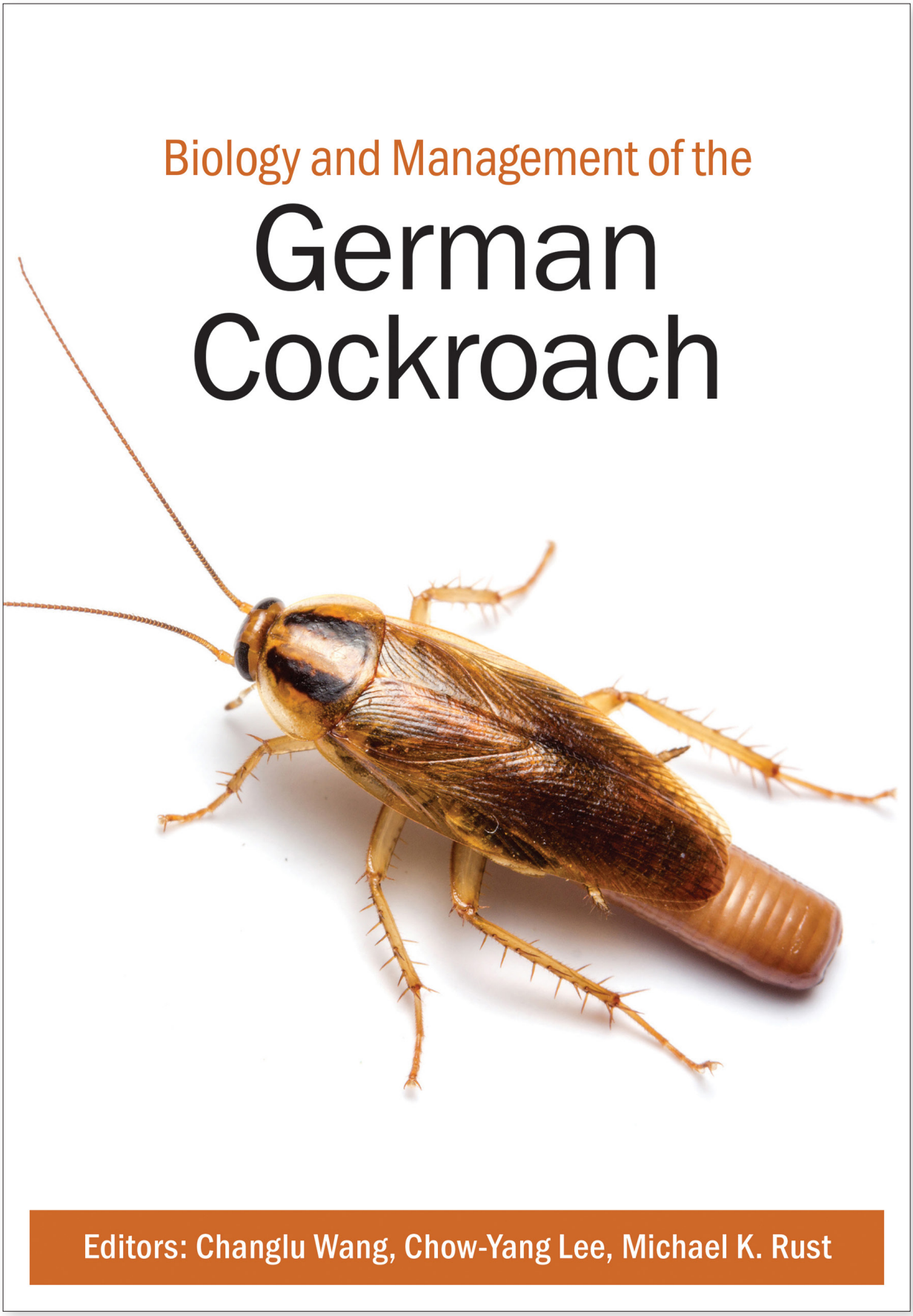
There are researchers in the field of urban pest control whose work I always follow. This includes the likes of Prof. Changlu Wang (Rutgers University, USA), Prof. Chow-Yang Lee (University of California), and Prof. Michael Rust (University of California). However, when such icons team up on a project, you know that the outcome will be something truly special, and so it is with the release of the new text, *Biology and Management of the German Cockroach*. Furthermore, this work contains contributions from some of the greatest minds in the field of cockroach research. This includes Prof. Coby Schal, Prof. Edward Vargo, Prof. Dini Miller, Prof. Arthur Appel, Prof Michael Scharf, and Judith Black, to name but a few of the 14 great authors who wrote sections of the book.

In case you did not know, there is something quite unique about *Blattella germanica*, commonly called the 'German' cockroach. Not only it is a cosmopolitan pest, it is a species uniquely adapted to humans and only occurs indoors. In fact, no population of the species is known to exist anywhere in the world outside of human-built structures. With this predilection for the human environment, the species has become a serious pest. The World Health Organization has recognised the German cockroach as a health threat as it can contaminate food, transmit pathogens, and the allergens it produces are the source of respiratory complications such as asthma. Furthermore, the German cockroach poses a significant economic threat to food production facilities, catering services such as restaurants, and to residents. Many pest managers spend their whole career focusing on the control of this one insect pest.

The *Biology and Management of the German Cockroach* is the first book dedicated to this species published in the last 25 years. Over this time there have been huge developments in research on the pest, for example, think how baits have replaced insecticidal sprays in recent years. Thus the book summarizes the last 25 years of research and provides a comprehensive historical overview of the management of the species.

The book is divided into 13 chapters and is preceded by a Preface that provides an excellent overview of the book and a dedication to some of the most famous cockroach researchers in the world.

Chapter 1 is titled "*German cockroach infestations in the world and their social and economic impacts*", written by Chow-Yang Lee and Changlu Wang. This section provides an introduction to the pest, from its origins to its global spread around the world. In the process, many examples are given on how dominant this pest has become. For


Biology and Management of the
German Cockroach
Editors: Changlu Wang, Chow-Yang Lee, Michael K. Rust

example, in a survey of 100 food establishments in Los Angeles during the early 1990's, some 62% were infested with German cockroaches. In one apartment over a 24 hour period, some 3,657 cockroaches were collected on six sticky traps that led the researchers to estimate that the population was over 120,000 – in the one home (ugh!). The authors infer that the rise in the German cockroach in Europe was due to central heating and increasing resistance to insecticides.

Prof. Changlu Wang

Chapter 1 also focuses on the huge economic impact of German cockroaches. One study in Georgia, USA, found that the species was responsible for 40% of the damaged caused by insects to the home, with the total damage estimated at the time to be USD$124.65 million. Typically in the US cockroaches account for around 15.3% of the total pest control market, which was estimated to be USD$16 billion in 2019.

One extraordinary cost that was mentioned, was the appalling low amount spent on cockroach management in low-income housing in the US that varies between USD$1.50 to $4.06 per apartment each month. The authors concluded that, "…the monetary incentives of cockroach IPM in these situations is so low that reasonable control efforts are often wanting." No wonder these sites often have major infestations!

Chapter 2 by Coby Schal and Zachary DeVries focuses on the public health and veterinary importance of the German cockroach. They note the potential for the species to transmit human pathogens, although state that, "…there are no studies showing a clear epidemiological relationship between cockroaches and infectious disease in real-world settings." However, what is real, is that cockroach allergens can cause serious allergic reactions and trigger respiratory distress including asthma.

Asthma is the most frequent cause of hospitalisation in children and one study showed that 37% of children were allergic to cockroach allergens, while another investigation reported that 26% of the US population is sensitive to the allergens. Furthermore, other investigations have found that the majority of homes have detectable levels of cockroach allergens, with 10.2% having levels high enough to trigger asthma attacks. Other studies have found a strong association household income and cockroach infestations, such that low-income houses tend to have greater levels of infestations. The authors concluded that if more attention was paid to cockroach management, that millions of dollars could be saved on medical expenses.

The next chapter by Arthur Appel examines the biology, nutrition and physiology of the German cockroach. Naturally, information on the insect's biology forms the basis of all management plans and thus such information is critical to include.

Chapter 4, written by the Chief Editor, Changlu Wang, is directed towards those that undertake research on this insect and focuses on the rearing of the species. Without the insect, no research is done. Fortunately, the German cockroach is a relatively easy species to breed in captivity.

'Endosymbionts and the gut microbiome' is the title of Chapter 5, written by Jose Pietri and Madhavi Kakumanu. Cockroaches possess a range of endosymbionts (bacterial-like organisms that live within the creatures' cells) and microorganisms within the gut. In recent years, these have been of great research interest and investigated as a potential means of control. It is also thought that the gut microbiome could be involved in insecticide detoxification, and thus

confers a degree of insecticide resistance.

Cockroaches are gregarious insects that release a range of pheromones, some of which can be synthetically produced and used as an attractant in traps. Thus Chapter 6 by Coby Schal and Ayako Wada-Katsumata, examines behaviour and chemical ecology. In comparison, Chapter 7 by Edward Vargo, looks at dispersal and population genetics. It is quite extraordinary to think, considering how widespread the German cockroach is, that the first record of the species outside of Europe was only in 1842 from New York. This is a species that has undergone a rapid expansion, all due to human movements around the globe.

It is the chapters beyond this that will hold the greatest interest for the pest control industry.

Chapter 8, by Changlu Wang, discusses monitoring. This section provides a comprehensive review of the topic covering the types of monitoring, from resident interviews to sticky traps, with and without attractants. Changlu Wang reviews the best sampling techniques for traps, which is an area where many pest managers could improve on.

Chapter 9 is a very thorough review of chemical control methods by Chow-Yang Lee and Michael Rust. The reality is that while IPM is the desired dream for pest management, chemical control is still the most cost effective solution for cockroach control. Much of the chapter is taken up with tables that reviews the range of insecticides that have been tested for laboratory and field efficacy against the German cockroach for over the last 25 years. Active ingredients used, the formulations applied, and application equipment are also examined. There is also an excellent review of the various botanicals and natural products used against the species.

As baits are the mainstay of German cockroach management for the professional today, Chapter 10 by Arthur Appel and Michael Rust, which looks at management using baits, will have great appeal for the industry. As noted by the two authors, baits have several key advantages over traditional insecticides; baits can be precisely applied to harbourages where the cockroach occurs. Baits can also be placed in tamper-resistant stations and are less likely to generate insecticide residues. They do not need to be diluted, nor applied with expensive equipment, are quick to apply, and require little to no prep work. Baits are also low-toxic, have little to no non-target impacts, and are odourless. The chapter not only examines the range of actives used over the years, but also reviews the formulations, and the attractants used in the baits, and discusses bait avoidance, which was a huge issue identified in the mid-1990's. Baiting strategies, including placement are reviewed along with their field performance.

As insecticide resistance is a major issue with German cockroaches, a chapter on this topic is a necessity. Chapter 11 by Michael Scharf and Ameya Gondhalekar examines the history of resistance, the resistance process and mechanisms, and how resistance can be monitored. They also reviewed the various methods of resistance management, namely how to avoid resistance from occurring.

Prof. Chow-Yang Lee

The penultimate chapter by Michael Rust, titled 'Alternative control methods' reviews new management strategies. This includes sanitation, biological control, and other forms of novel control options that maybe used in the future. However, unless major resistance occurs, I cannot

see the industry moving away from baits in the near future.

The final chapter is more practically orientated and reviews German cockroach control in two of the most difficult situations encountered by the pest manager; multi-unit dwellings and commercial kitchens. This chapter was written by investigators who have undertaken a huge amount of research in controlling the insect in low-income housing, namely Dini Miller, Judith Black, and Changlu Wang. The authors reviewed the IPM process for cockroaches and discussed how such a program can be set up in these situations.

Included is a very detailed discussion on why apartment buildings in the US have such bad cockroach problems (in short, mostly due to a lack of money for control). An example was given whereby two technicians in New Jersey serviced 258 apartments housed in 40 different buildings, all in the one day. This equated to less than 4 minutes per apartment, and the technicians only used two tubes of gel bait for the entire application. It is thus no surprise that little control was achieved.

An alternative baiting approach is discussed called 'assessment based pest management', whereby stick traps are set and the amount of insecticide applied is based on cockroach counts. If counts are above 500 from the one apartment, then two tubes of gel are applied (rather than two tubes to 258 apartments in the example above!). Such an approach has resulted in dramatically reduced cockroach numbers, but using these large volumes of insecticide gels may increase the risk of resistance in the future.

Finally, the book includes a glossary and a detailed index.

Naturally in any review of a book, it is necessary to offer some critiques, and to be honest, some of the chapters were challenging to read. I did think that the language in a few sections could have been made more accessible to the majority by using less technical terms, or by explaining the terms in a more simplistic language. However, it is important to release this is a reference book

Prof. Michael Rust

and some chapters by the nature of their topic are going to be extremely scientific and harder to read. Thus it is difficult to simplify aspects such as population genetics, physiology, or even endosymbionts. Fortunately those chapters that are going to be of most interest to the pest management industry, including baiting, chemical control, monitoring, alternative control measures, and management in multi-unit dwellings and commercial kitchens, are quite straightforward to read.

The other aspect is that the book is quite US centric, with all authors and editors presently working in the US. However, this is understandable in that the vast majority of research on the German cockroach has originated from the States.

After finishing reading the book (yes I do read

the entire text of those that I review!), there was an obvious question that popped up in my mind; why are German cockroaches called 'German' if they originated from Asia and first described from Denmark? As I could not find an answer in the text, I had to email Prof. Chow-Yang Lee for the answer. Here is his fascinating reply;

"The hypothesis that the German cockroach originated from South Asia was only recently made. Some of us believe it evolved from the Asian cockroach (Blattella asahinai) that resembles the German species almost completely morphologically (except the Asian cockroach has longer and narrower wings, and some other minor morphological differences in the tergal gland) and behaviour. The Asian cockroach is active both at day and night, lives outdoors in leaf litter and grassy areas, can fly, and is attracted to light. On the other hand, the German cockroach is unable to fly, not attracted to light, and only found indoors. As for the tergal gland differences, you can only tell when you dissect the insects. In other words, if you have a live sample, the only way to tell which species is which, would be to throw the cockroach high and see whether it flutters away. If it cannot, it is a German.

Thus why this hypothesis on the species origins? Unlike the Asian cockroach that are found outdoors in South China and Japan, no German cockroach has been found in natural habitats to date. The German cockroach is only found in indoors.

It was believed that the Asian cockroach could have been accidentally transported to Europe via the Silk Road, or any of the sea trading routes from China/East Asia. Upon arriving to Europe, they could have propagated, but the majority died due to the cold winter. Those that did survive would probably be those that lived indoors in the presence of fires/heating devices/boilers. Over time, this species adapted to live indoors before spreading to other parts of Europe and then the world. The earliest specimen of German cockroach is in Europe, not in Asia.

Now, why it is called the German cockroach? Interestingly, the specimen that Linnaeus examined was not from Germany, but from Denmark. It was originally named Blatta transfuga by Brünnich in 1763. As you know, Linnaeus is a Swedish naturalist. At that time, the Seven Year War (from 1756–1763) was going on in Europe. The war involves many parties (it is complicated), but essentially it was between Britain and France and Spain in North America/Caribbean. Sweden, Russia, Austria, Spain and France were on one side, while Great Britain, Prussia, Portugal and other allies where on the other side. You know that Prussia was historically a prominent German state. Between 1757 and 1762, the Sweden–Prussia conflict happened. No one knows for sure, but Linnaeus likely renamed the obnoxious cockroach after the enemy, hence the name Blatta germanica. That's why it is known as a "German" cockroach. However, this is just a speculation – no one will be able to find out, unless we are able to hear from Linnaeus himself.

Thus the insect was likely called 'German' for purely derogatory reasons. Extraordinary! I do wonder if there will be an attempt in the future to rename the species due to rather nefarious reason behind the acquisition of its common name. Perhaps readers of the FAOPMA Magazine may offer a more politically correct suggestion?

The *Biology and Management of the German Cockroach* (ISBN: 9781486312061) is 307 pages, contains some 18 colour plates with over 40 images, and published by CSIRO Publishing and CABI. It will appeal to researchers, pest managers, students, public health workers and anyone who has to deal with this nuisance insect pest.

Thank you to Ms Melinda Chandler from CSIRO Publishing for providing a complimentary copy of the *Biology and Management of the German Cockroach*.

Chow-Yang Lee

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CSIRO Publishing are offering Australian & New Zealand customers a special 10% discount on the *Biology and Management of the German Cockroach* (published May 2021). Simply enter the promo code **FAOPMA** at the online checkout on the CSIRO Publishing website (www.publish.csiro.au) to receive this special offer. This discount offer is valid until 31 May 2021 on the print edition only, and while stocks last. It cannot be used in conjunction with any other discounts or offers. The Australian price pre-discount is $220.00

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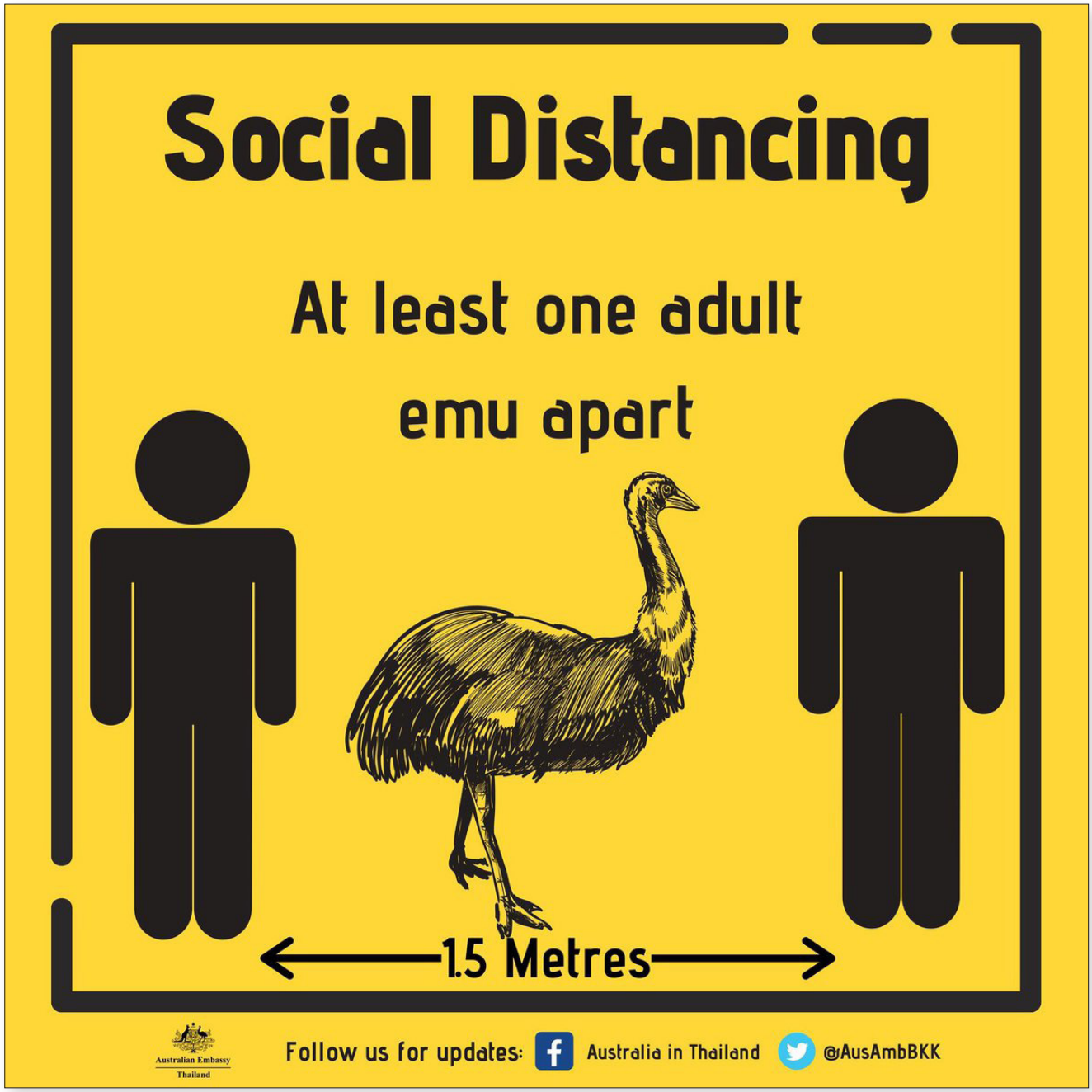
Social Distancing tips from Australia



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

AUSTRALIA

Due to the COVID-19 pandemic, the biennial conference of the Australian Environmental Pest Managers Association was cancelled in 2020. As Australia has had no significant local disease transmission for some weeks, a face to face event is planned for this year. This will occur over 22-24 September and to be held at the Star Casino, Gold Coast, Qld. More details can be seen on Page 41 of this issue or go to: https://aepma.com.au/conference. ■

CHINA

The Chinese Pest Control Association's (CPCA) annual conference was held in the city of Chengdu from April 1st to April 4th. The conference highlights include the keynote speech by Dr. Zhang Wenhong, who is the leading expert in the fight against COVID-19 in China. A large exhibit that showcases the latest products and services in the pest management industry in China was present, as well we many technical and educational sessions. For more information, please contact: pioneer@cpca.cn

CPCA hosted an essay competition titled "The Weikang Cup" from December 2020 to February 2021. There were 118 essay entrants, which consist of 84 academic papers and 34 essays on general topics related to the pest management industry in China. The competition is intended to encourage knowledge sharing and improve professionalism.

CPCA hosted a national PCO technical competition in December 2020. Competition included entomological knowledge, technical skills, and live question and answer sessions. ■

Report provided by Mr Pascal Cai.

PAKISTAN

The Structural Pest Management Group of Pakistan along with the C-Shine Group hosted a webinar on Fly Management in 24 March 2021. The focus was on fly management in restaurants. Speakers included:

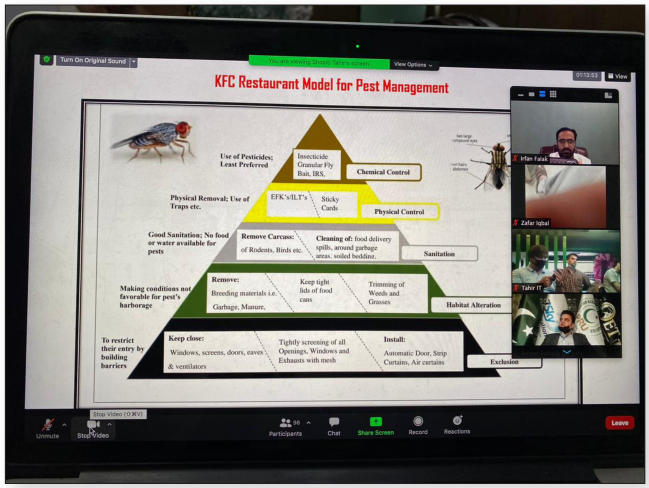
- Aamer Rafique Qureshi, Chairmen Pakistan Restaurants Unity Association,
- Tahir Rashid, Director of Sales, Brandenburg, UK,
- M. Shoaib, Head of Quality Assurance, KFC, Pakistan,
- Laraib Shoaib, Assistant Manager Quality, MacDonalds, Pakistan,
- Rizwan Akmal, Manager Operations, Gloria

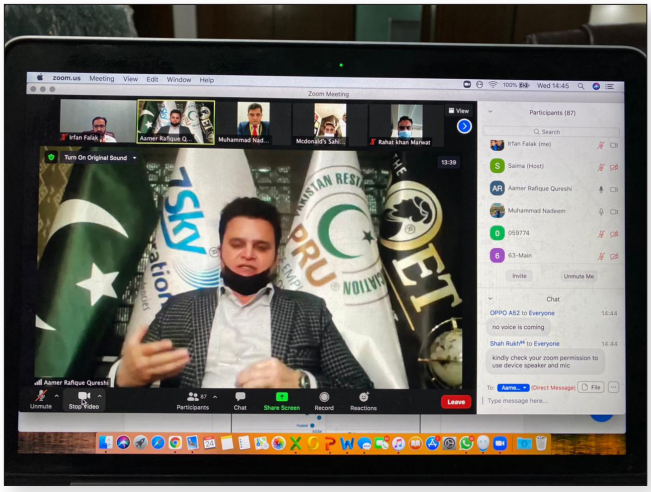
Jean's Coffee, Pakistan, and,

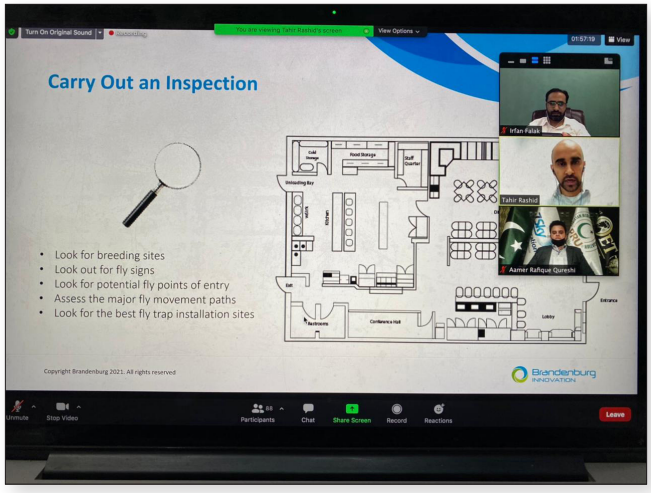
- M. Nadeen, Cluster Hygiene Managers, Gulf Hotel, Bahrain Convention & Spa.

The following depicts some images from the event. ■

Images provided by Ms Saima Gondal.







PHILIPPINES

PEAP After Four Decades

Traversing a memory lane which expands four decades, Pest Exterminators Association of the Philippines (PEAP) reminisces and realize how it persisted to grow and progress over the years.

Numerous words can describe the success story of PEAP since its inception in 1979, but only one word seems fit to capture everything it had endured – "transitions." Defined as a *"passage from one stage to another,"* PEAP features a humble beginning and a bumpy ride in between, until it reached this point where every facet of its systems and operations reflects the remarkable metamorphosis that has taken place over the years. I say remarkable metamorphosis because the breadth of progress was beyond the pioneers' envisioned feats!

In terms of training, the Association transitioned from a singular domain of learning to a plethora of topics varying from technical skills development trainings, psycho education seminar-workshops, leadership and management courses, and pedagogy of valued soft skills in entrepreneurial organizations. Same is true with its use of online and web-based facilities. Moving from the traditional face to face interactions and paper-driven strategies to advertise its programs and services, PEAP upgraded to fully utilize the technological resources our post-modern society offers. So now, it does not come as a surprise to find PEAP in various social media platforms.

Correspondingly, inclusion of automated processes and systems have likewise become evident in the development of the Association. This change is part of the paradigm shift it attempts to convey so that services rendered will radiate an effective and efficient member-oriented organization.

With a developed mindset dedicated to quality service, PEAP people have displayed active engagement to community outreach programs as shown by their consistent participation in socio-civic activities and volunteer work focused on advocacies promoting health and sanitation. Membership expansion has likewise exhibited remarkable change in the past decades. This change implies increasing membership, consequently, fiscal boost. As a result, programs, and activities the Association planned yearly were successfully carried out given sufficient funding and manpower assistance. Notwithstanding, outstanding evaluation results gleaned from the feedback of program participants.

Over-all, PEAP has gone a long way in every aspect of its existence. Henceforth, uncertainties of the future remain unmerited to vanquish PEAP's spirit of resolute commitment to move beyond the borders of distinction. PEAP of the past, the present, and the future will continue its legacy as the prime pest exterminators' association in the Philippines! Mabuhay ang PEAP.

The current leadership of PEAP for calendar year 2021-2022 includes the following Officers and Board of Directors: Clark Henry P. De Paz (President), Michael M. Clemente (Vice President), Hermogenes G. Culminas (Secretary), Cescar M. Siy (Treasurer), Christian B. Berry (Auditor), Giovanni L. Villela (PRO), Randel T. Porras (Sgt. At Arms); Maria Carmelita L. Lopez (Board of Director); Angelo Jason L. Roa Yu (Board of

Director), Allan John S. Vergara (Board of Director), Adlai Jan G. Jawid (Board of Director), Miraflor A. Cabalan (Board of Director); and Gilbert Q. Umali (Board of Director).

PEAP New President

Mr. De Paz, joined the PEAP in 2013 and has held several positions including Secretary, Vice President, and now President. Mr. De Paz is also a Board of trustee of the United Pest Management Association of the Philippines Inc. (TUPMAPI). Currently, He is the Consultant, and Managing Partner of Briones Pest Control Services, a family owned-business back by 17 years of experience in pest control industry which campaigns that providing a greener & safety methodology will help protect the public health, same as to the technical working personnel of a pest control operator.

Mr. Clark Henry P. De Paz (Philippines)
Pest Exterminators Association of the Philippines Inc (PEAP)

SINGAPORE

Singapore introduces a Code of Practice (COP) For Vector Control Operators, Technicians and Workers

The National Environment Agency (NEA) in Singapore has published a Code of Practice (COP) for the Vector Control Operators, Technicians and Workers in October 2020. The COP was developed in consultation with the Singapore Pest Management Association (SPMA).

This COP will guide practitioners to comply with the Control of Vectors and Pesticides Act and its subsidiary legislation in Singapore, as it spells out the roles and responsibilities of a Vector Control Operator (generally known as pest control/ management company) and its personnel (Vector Control Technician and Worker). It also highlights the registration, licensing and certification requirements for Vector Control Operators, Technicians and Workers.

Being the first edition, the objectives of this COP are to:

- Provide a guide to individuals working in the vector control industry;
- Promote safe and professional practices when carrying out vector control work;
- Minimise detrimental impact to humans, animals and the environment arising from improper vector control work;
- Define best practices of a professional vector management programme; and
- Provide a reference guide for service buyers seeking professional pest control services

Key components in the new COP include:

- Pesticide application guidelines and safety measures;
- Usage, disposal, storage and transport of registered pesticides;
- Process flow of professional vector control services using Integrated Pest Management (IPM); and
- Providing sample reports of service, surveillance, site surveys and checklists.

All Vector Control Operators, Technicians and Workers in Singapore are encouraged to adopt the guidelines and best practices stated in the COP when carrying out vector control works.

The publication of the COP would not have been possible without the valuable inputs from the SPMA council and industry experts, and the cooperation between the NEA and SPMA. The COP is available on NEA's website here. ■

Report provided by Hazel Lim.

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

MALAYSIA: HUGE COCKROACH NUMBERS IN POPULAR TOURIST SPOT

A man walking along the popular Melaka River waterfront in Malaysia was horrified when he noticed a pillar for the safety chain to prevent people from falling into the river, absolutely covered in cockroaches (they appear to be the American species). He even saw two people fishing in the river, one fanning away roaches from this neck. His images have been shared multiple times via social media and can be seen in the link below.

Source: *Says* (30/Mar/2021), https://says.com/my/news/melaka-river-cockroach

INDIA: ANTS STEAL GOLD CHAIN

In New Delhi, a group of thieving ants were filmed carrying away a gold chain. The video can be seen on Twitter at https://t.co/6kBASYP0si. It is curious to speculate why they were doing this – presumably the chain contained body odours or the remains of a meal to attract the ants. Or was it a present for their Queen's coronation?

Source: *ZeeNews* (26/Mar/2021), https://zeenews.india.com/viral/video-of-these-ants-stealing-gold-has-taken-over-social-media-netizens-cant-stop-laughing-2350790.html

PHILIPPINES: AMUSING 'ACCIDENTAL' COCKROACH TIKTOK VIDEO

A woman from the Philippines was filming a TikTok video of her making an omelette and unfortunately a cockroach crawled onto her shirt while in the middle of recording. She thought that she had brushed the offending roach off, but it crawled up her shirt to sit on the collar. Her facial expression gives a great indication of how she felt about the roach. The video has since gone viral and worth a watch.

Source: *RojakDaily* (23/Mar/2021), https://rojakdaily.com/entertainment/article/11877/oh-no-no-no-girl-oblivious-to-cockroach-on-her-t-shirt-while-filming-cooking-video-goes-viral

TIME-LAPSE OF ANTS DEVOURING FRUIT

A time lapse video was recently taken of ants eating a slice of tangerine. The video appears in the link below. Sadly the ant species is not mentioned

Source: *BoingBoing* (23/Mar/2021), https://boingboing.net/2021/03/23/watch-timelapse-video-of-ants-devouring-a-tangerine-slice.html

AUSTRALIA: FLOODS CAUSE SPIDERS TO MOVE ONTO BUILDINGS

Much of eastern Australia is presently experiencing flooding with extreme weather conditions. This had forced all the ground dwelling spiders such as wolf spiders, to seek higher grounds. Buildings, fences, and homes, are being covered with thousands of spiders, as these

eight legged creatures attempt to keep their feet dry. See the amazing images and videos of the spider plague in the links below.

Source: *ABC News* (22/Mar/2021), www.abc.net.au/news/2021-03-22/nsw-floods-spark-plague-of-spiders-on-mid-north-coast/13265850 and www.youtube.com/watch?app=desktop&v=wMe6H7LVy94&feature=youtu.be

AUSTRALIA: HOPE FOR SUCCESSFUL EXOTIC ANT ERADICATION

Pheidole fervens is a species of ant originally described from Singapore and is a widespread invasive species that poses a serious biosecurity risk. The ant was first detected in 2019 at a Brisbane port in Queensland and an eradication program was initiated. Twelve months after the initial detection, the ant can no longer be found and the species now appears to be eradicated [SLD: sadly there are other exotic ant introductions into Australia that have not been so successful, such as the Red Imported Fire Ant].

Source: *Mirage* (22/Mar/2021), www.miragenews.com/biosecurity-winning-against-exotic-ants-at-531847/

UK: RODENT STEALS GPS PET TRACKING UNIT, SENDS OWNER ON WILD CHASE

A pet owner in the UK purchased a GPS tracking unit for his cat that was controlled by an App on the owner's phone. Unbeknown to the owner, the GPS device dislodged from the cat's collar, but when the owner logged into the tracking App, it showed the GPS device was running across people's gardens. When the pet owner attempted to follow the unit, he could not find the cat, even though the App was suggesting the tracker was present. Upon following the tracker, the owner realized that it was following the drainage system in the area. Apparently a rat had bitten the cat, swallowed the tracking unit in the process, causing the wild goose chase!

Source: *The Sun* (20/Mar/2021), www.thesun.co.uk/news/14404478/cat-owner-confused-gps-rat-ate-device/

AUSTRALIA: PATIENTS BITTEN IN HOSPITAL WITH MOUSE PLAGUE

As mentioned in other news items below, eastern Australia is in the middle of one of the most severe mouse plagues ever documented. The mice are even entering hospitals and a number of patients have been received bites. In response, health staff have enhanced the trapping and baiting program, added odour repellents, enhanced sanitation efforts, and tried to improve seals around access points. So far all the bites have been considered minor.

Source: *The Bulletin* (19/Mar/2021), www.themorningbulletin.com.au/news/hospital-patients-bitten-in-rodent-plague/4219906/

SINGAPORE: STALLHOLDER SEEN SPRAYING INSECTICIDES NEAR PRODUCE FOR SALE

At a food stall located at Bangkit Road in Bukit Panjang, a stall holder was seen turning over vegetables and spraying underneath for cockroaches. Several people observed and recorded the act and reported the stall holder to the Singapore Food Agency (SFA). According to the stall holder, she claims cockroaches are a "headache" and was not sure how to control them. The SFA stated that, "Baygon is an insecticide meant for vector control and should not be used on food. SFA is looking into the matter."

Source: *Mothership* (16/Mar/2021), https://mothership.sg/2021/03/bukit-panjang-vegetables-stallholder-spray-insectide/

VIETNAM: MAJOR OFFENCE AGAINST RATS INITIATED

Rats have been causing major crop damage in the City of Can Tho on the Mekong delta. There are now plans to spend VND30 billion (USD$1.3million) in order to combat the rodents over the next five years. Farmer will receive training on how to combat the rodents and will receive traps and rat poison. The Mekong area accounts for around 17% of the nation's GDP and the rodents have been causing serious economic losses.

Source: *VNExpress International* (14/Mar/2021), https://e.vnexpress.net/news/news/can-tho-plans-major-offensive-against-rats-4248181.html

INDIA: NETS INSTALLED OVER CANAL TO STOP MOSQUITOES

In one of the stranger mosquito control programs, officials in Kolkata have installed a net over a canal to contain the mosquitoes that breed in the

water system. The authorities admit that they do not know if this will work and are using this as a pilot test program. However, they have failed to tackle the real problem; the build-up of rubbish and extensive growth of water hyacinth that is blocking water flows leading to the mosquito breeding.

Source: *The Times of India* (13/March/2021), https://timesofindia.indiatimes.com/city/kolkata/net-cast-over-canal-to-curb-mosquito-menace/articleshow/81473398.cms

AUSTRALIA: DENGUE MOSQUITOES FOUND IN TENNANT CREEK

Tennant Creek is a remote town in the Northern Territory of Australia, which is a non-endemic region for the dengue mosquito, *Aedes aegypti*. In the last few decades, the mosquito has become established in the town, which has prompted a costly but successful eradication campaign. The mosquito was again detected in Tennant Creek during surveys by health entomologists during late February. An enhanced monitoring program will now begin along with a new eradication program. Tennant Creek is a transport hub and it is thought that the mosquitoes were brought in via vehicles. Much of the Northern Territory is receptive to *Aedes aegypt*i and if the species became established in this town, it could spread to other areas, leading to outbreaks of dengue virus.

Source: *The West Australian* (9/Mar/2021), https://thewest.com.au/news/health/dengue-mosquitoes-found-in-outback-nt-ng-s-2052657

UNITED ARAB EMIRATES: MOSQUITO AND FLY PROGRAM ENHANCED IN ABU DHABI

With the onset of the mosquito breeding season, the management program has been enhanced along with fly control. The program involves site surveys to look for potential breeding, as well as sustainable control solutions. Post treatment control is always accessed. Pictures from the program can be obtained in the link below.

Source: *Khaleej Times* (9/Mar/2021), www.khaleejtimes.com/photos/nation/abu-dhabi-steps-up-mosquito-fly-control-measures

ALEUTIAN ARCHIPELAGO: RAT ISLAND NOMORE!

In the Aleutian Archipelago on the western tip of Alaska, one island was so rodent infested it became to be known as 'Rat Island'. The rats were introduced via shipwrecks dating back to the 1700s. They quickly became established and severely damaged native habitats, along with the flora and fauna. Many shorebirds quickly became extinct on the island along with a range of invertebrates. A rodent eradication program was initiated in 2008 and proved to be successful. Now wildlife has returned and the island is rapidly recovering [SLD: it is very encouraging to see humans fixing past mistakes, the next big challenge will be dealing with the devastating effects from Climate Change.]

Source: *US San Diego News Center* (8/Mar/2021), https://ucsdnews.ucsd.edu/pressrelease/island-of-rats-recovers

INDIA: BENGALURU IS THE COCKROACH ALLERGEN CAPITAL

A study undertaken in collaboration with the electronic manufacturer Dyson, found that homes in Bengaluru (formerly known as Bangalore) had the highest rate of cockroach allergens compared with a number other major cities in India. Cockroach allergens are a major source of respiratory problems such as asthma and can also trigger allergic rhinitis. Proper cockroach management will reduce the amount of allergens in the home.

Source: *The New Indian Express* (6/Mar/2021), www.newindianexpress.com/cities/bengaluru/2021/mar/06/in-allergy-capital-homes-full-of-roach-cats-allergens-2272876.html

USA: FLEA COLLAR LINKED TO 1,700 PET DEATHS

A popular flea collar sold in the US and marketed under the name of 'Seresto' has been linked to more than 1,700 pet deaths and have led to more than 75,000 complaints being raised to the US Environmental Protection Agency. The collars use two different insecticides and it is the combination of actives that is thought to be causing the problem. The company behind the product, Elanco, is denying the link between the pet deaths and the collars.

Source: *News10* (6/Mar/2021), www.news10.com/top-stories/report-popular-flea-tick-collar-

tied-to-1700-pet-deaths-epa-received-more-than-75000-complaints/

NEW METHOD FOR RODENT MANAGEMENT: BIRTH CONTROL

With the considerable adverse news on the non-target impacts of the second generation anticoagulants (see previous issues of the *FAOPMA Magazine*), alternatives means of management need to be investigated. One company in the US has developed a product called 'ContraPest', which renders rodents infertile from two to six months. The product contains two naturally occurring substances, triptolide and 4-vinylcyclohexene diepoxide, which stops the release of eggs in the female rat, and deforms sperm in the males. The product is high in sugar and fats, which makes it tasty to rodents. Unfortunately the product is expensive and can double the cost of rodent programs.

Source: *AZCentral* (6/Mar/2021), www.azcentral.com/story/news/local/arizona-science/2021/03/06/how-roof-rat-birth-control-could-curb-growing-population-problem/4541408001/

INDIA: RESIDENTS IN BOPODI IN LOCKDOWN DUE TO MOSQUITOES

The residents of Bopodi, near Mumbai are in lockdown not to COVID-19, but due to the plagues of mosquitoes that appear at dusk. The Mula River has become blocked by an overgrowth of water hyacinth, which has provided habitat for mosquitoes to breed in. Currently the local government has not attempted to control the hyacinth and rates of mosquito-borne disease in local residents have increased.

Source: *Pune Mirror* (5/Mar/2021), https://punemirror.indiatimes.com/pune/cover-story/iaf-retiree-unearths-plot-to-grab-his-land-with-fake-documents/articleshow/81317107.cms

COOK ISLANDS: DENGUE ERADICATION PROGRAM LAUNCHED

An outbreak of dengue was declared in February and so a mosquito control campaign was initiated. So far for the year there have been 28 probable and 30 confirmed dengue cases in Rarotonga with 21 admissions to hospital. Young people in the age range of 11 to 19 have been most affected.

Source: *RNZ* (4/Mar/2021), www.rnz.co.nz/international/pacific-news/437624/cook-islands-mosquito-eradication-steps-up

AUSTRALIA: CHIEF EDITOR APPEARS ON TV TO DISCUSS BED BUGS

Stephen Doggett, the Chief Editor of this magazine, recently appeared on the television program, The Morning Show, to talk about bed bugs, the global resurgence and the factors behind their recent rise. You can watch this from the link below.

Source: *Channel 7 The Morning Show* (3/Mar/2021), https://twitter.com/i/status/1366895116770709506

AUSTRALIA: DANGERS FROM 'JACK JUMPER' ANTS

'Jack jumpers' (pictured above) are so called for their propensity to jump. These are a large primitive group of ants belonging to the genus *Myrmecia*. They have extremely good eyesight, are highly aggressive especially if the nest is attacked, and possess a very large, and painful sting [SLD: I can testify to the pain!]. In Tasmania, in the south of Australia, the sting from Jack Jumpers commonly cause severe anaphylactic reactions. In fact Tasmania has the highest rate of anaphylactic reactions in all of the country from ant stings. It is estimated that around 1 percent of the population is at risk of a serious reaction. As such, many patients are required to go through a desensitization program to avoid serious complications, even death, from the sting of the

ant.

Source: *ABC News* (3/Mar/2021), www.abc.net.au/news/2021-03-03/jack-jumper-ant-bite-treatment-works-for-tasmanian-family/13208530

NEW ZEALAND: HUTS ON FAMOUS WALKING TRACK INFESTED WITH BED BUGS

Rakiura Track is a popular walking trail on Stewart Island in southern New Zealand. Along the way is a hut where walkers often spend the night. Unfortunately the hut became badly infested with bed bugs and many chose to sleep on the floor in the kitchen rather than being bitten in the bunk beds. The hut has now been treated four times. There are now calls to alert future users of the hut that bed bugs are present and people should bring their own camping gear instead of using the huts [SLD: it is not uncommon for overnight accommodation on popular walking trails to become infested with bed bugs. The famous Camino de Santiago trail in Spain, a well-known route for pilgrims, has had huge issues with bed bugs in the huts along the trail to the point of an information pamphlet being produced warning walkers of bed bugs.]

Source: *Stuff* (3/Mar/2021), www.stuff.co.nz/travel/travel-troubles/124416440/stewart-island-visitor-disappointed-by-visit-to-bed-bug-infested-doc-hut-on-rakiura-track

RUSSIA: RAT FAECES IN SCHOOL FOOD LEAVE 56 CHILDREN CRITICALLY ILL

Children from 17 different schools in Krasnoyarsk in Russia became ill after eating food that was contaminated with rodent faeces and urine. The student were infected with a bacteria called *Yersinia*, which can cause fever, abdominal pain, and diarrhoea. A total of 91 students were infected, with 56 seriously ill. Not cleaning the vegetables or under cooking them increases the risk of the disease.

Source: *The Scottish Sun* (3/Mar/2021), www.thescottishsun.co.uk/news/6764982/mass-rat-faeces-poisoning-children-critically-ill-school/

TAIWAN: TERMITES SPREAD VIA DRIFTWOOD

Research has shown that some species of termites can resist saltwater supporting the claim that some species can be spread across oceans via driftwood. While adults can only fly a few kilometres at best, many species of termites are found across continents and island chains. A researcher from Taiwan examined the ability of a number of termite species to withstand saltwater and found that some could survive for months. This supports the claim that termites can be spread across oceans via driftwood.

Source: *Focus Taiwan* (3/Mar/2021), https://focustaiwan.tw/sci-tech/202103020009

INDONESIA: FROG SWALLOWS MOUSE

A photographer captured the moment when a green tree frog in Indonesia captured and swallowed a mouse. The frog used its mouth to crush and kill the mouse, which then took around five minutes to swallow. Images of the mouse being captured can be viewed in the link below. Perhaps this is a new form of rodent control?

Source: *The Scottish Sun* (2/Mar/2021), www.thescottishsun.co.uk/news/6763707/frog-eats-mouse-whole-indonesia/

CAMBODIA: DENGUE MOSQUITOES INVADE PHNOM PENH

A mosquito survey undertaken in Cambodia has found *Aedes albopictus* living in the capital of the country. Previously it was thought that they only occurred outside Phnom Penh. However the survey found the species in 40 different sites, including urban areas. The city does have *Aedes aegypti*, the main dengue vector, but a second species capable of transmitting the virus will increase the risk of local outbreaks. The last biggest dengue outbreak in the capital occurred during 2019 where there were more than 68,000 cases and 48 deaths.

Source: *Khmer Times* (1/Mar/2021), www.khmertimeskh.com/50819098/dengue-mosquitoes-invade-capital-2/

INDIA: MOSQUITO COIL FIRE DESTROYS THREE HOUSES IN NAGERCOIL

Even more examples are emerging of the dangers of mosquito coils in starting fires. In Nagercoil, in the far south of India, three homes were destroyed after a fire started from a mosquito coil. One woman suffered severe burns in the process. This again highlights the need to be careful in using these products.

Source: *Times of India* (26/Feb/2021), https://

timesofindia.indiatimes.com/city/madurai/fire-from-mosquito-coil-guts-3-houses-in-nagercoil/articleshow/81218364.cms

AUSTRALIA: FLESH EATING ULCER SPREADS TO MELBOURNE

A form of flesh eating ulcer, originally called 'Bairnsdale' ulcer, but now termed 'Buruli' ulcer has appeared in Melbourne suburbs. It was first identified in the Gippsland area of the state back in the 1930's but in more recent times a number of human cases have occurred in the Bellarine Peninsula, on the western shores of Port Phillip Bay. The ulcer is caused by a type of bacteria, a *Mycobacteria*, which is difficult to treat even with antibiotics. Current thinking is that it is spread by mosquitoes, but research into the transmission pathways of the bacteria are still underway (see second article listed below). The condition spread eastward and has made its way northern to Melbourne, which is the most populated city in the state and capital of Victoria. So far some 21 human cases have been identified in 2021.

Source: *Nine news* (24/Feb/2021), www.9news.com.au/national/buruli-ulcer-cases-emerge-in-melbourne-from-victorian-coastline/83cf5874-51e0-4849-ba76-df345560efc8 and *The Age* (20/Feb/2021), www.theage.com.au/national/victoria/new-research-to-curb-march-of-flesh-eating-disease-in-victoria-20210219-p5740v.html

CHINA: CUSTOMS SEIZE OVER 400 LIVE ANTS

The live ant trade is a real problem in China with many collectors actively seeking exotic species from around the world. Naturally this comes with the risk of the potential of the introduction of exotic diseases and the establishment of potentially new ant pests. Custom officials in Shanghai x-rayed a container marked 'dental supplies' and found it full of small vials, each containing a live ant (see image bottom left). It was stated in the article below that in 2021, customs seized over 380 species of pests on almost 700,000 occasions. It is easy to see how exotic pests can be introduced into a country.

Source: *Shine* (24/Feb/2021), www.shine.cn/news/metro/2102245047/

BAYER TO DIVEST ENVIRONMENTAL SCIENCE BUSINESS

Bayer announced that they are going to strengthen their core agricultural division by 'divesting' (i.e. selling) their Environmental Science Professional Businesses (ESPB), which includes the chemicals used in vector and urban pest control. This follows on from their sale of the garden products some time ago. The sale of ESPB is arguably not good for the pest control industry as there is one less big player in the game, meaning fewer sponsorship opportunities. It has been speculated that the sale could be related to Bayer's purchase of Monsanto as Bayer has inherited the huge payouts (USD$10.9billion) associated with legal claims concerning the product Roundup and its link to cancer in users of this product. However, no one from the company has confirmed this speculation. Odds on favourite for the purchase is Sumitomo, but we will have to wait and see if this comes to fruition.

Source: *Bayer* (24/Feb/2021), www.media.bayer.com/baynews/baynews.nsf/id/Bayer-Divest-Environmental-Science-Professional-Business-Further-Strengthen-Leadership-Team-Crop?

BANGLADESH: HOW *NOT* TO DO MOSQUITO CONTROL!

In a report titled "*CCC starts anti-mosquito drive*", details are provided on how the Chattogram City Corporation is initiating a program to control mosquitoes. However, the image depicted is a prime example of how *not* to do mosquito control. The image shows presumably an official of the Corporation pointing a fogger at a water body, while he is surrounded by onlookers. Not

only are foggers not used for the control of larvae (and foggers would not be used during the middle of the day when the image appears to have been taken), none of the people are wearing safety equipment or have the correct respiratory protection fitted. Furthermore, it is disappointing to see a lack of social distancing during the COVID-19 pandemic (including the guy in the background who removed his mask for a selfie). While we can have sympathy with the mosquito problems in the region and the disease burden on the community, it is hard to find empathy for officials who blatantly ignore the principles of sound pest management.

Source: *New Age Bangladesh* (20/Feb/2021), www.newagebd.net/article/130742/ccc-starts-anti-mosquito-drive

AUSTRALIA: RAT SEEN ON MANNEQUIN IN DESIGNER CLOTHING STORE

In Adelaide, the capital city of South Australia, a shopper noticed a rat on the mannequin in the window of the clothing store Witchery. The store was closed at the time. The shopper made a video of the incident, which has been viewed more the 50,000 times on Instagram. This can be seen in the link below.

Source: *Daily Mail Australia* (18/Feb/2021), www.dailymail.co.uk/news/article-9272125/Horrified-shopper-spots-RAT-mannequins-shoulder-designer-store.html

THAILAND: HOTEL THREATENS TO SUE PATRON AFTER SERVING HIM FOOD WITH COCKROACH

A quarantine hotel in the Chonburi province is threatening legal action after a guest reported on social media that they served food containing the remains of a cockroach. The guest was quarantining at the Ambassador City Jomtien Hotel and made multiple complaints about the hotel online, mostly relating to the unsanitary conditions that he claims to have experienced. Now the hotel is threatening legal action if the guest fails to apologize but he is not backing down. Images of the hotel appear in the links below. Late last year an American staying in a hotel on Koh Chang was forced to apologise after making an online complaint as he was facing a jail sentence.

Source: *The Taiger* (18/Feb/2021), https://thethaiger.com/news/chon-buri/quarantine-hotel-threatens-to-sue-over-complaint-about-cockroach-in-food and *Coconuts* (17/Feb/2021), https://coconuts.co/bangkok/news/thai-quarantine-hotel-serves-man-a-roach-leg-then-sues-him-for-talking-about-it/

INDIA: MAN LOOSES LIFE SAVINGS AFTER TERMITES EAT CASH

An Indian man from the city of Mylavaram lost his entire life savings after termites attacked the paper currency that was stored in a suit case. The man dreamed of owning a house and was devastated when he found the notes destroy. He lost an estimated 5 lakhs (around USD$7,000).

Source: *The New Indian Express* (17/Feb/2021), www.newindianexpress.com/states/andhra-pradesh/2021/feb/17/termites-devour-pig-rearers-lifetime-savings-of-rs-5-lakh-2265118.html

MIDDLE EAST: PEST CONTROLLER LEFT RAT POISON IN SCHOOL GROUND

A pest control employee in Israel and his company was indicted after leaving rodent poison in a kindergarten yard. Children were seen opening the container that held the poison and touching it. Fortunately they were quickly stopped by a teacher. Apparently the pest controller did not have the correct license as well as violated the label instructions by leaving the product in an inappropriate location. Some three years ago, a pest controller was jailed for three years after his actions lead to the death of two young girls after exposing them to toxic chemicals.

Source: *The Times of Israel* (17/Feb/2021), www.timesofisrael.com/pest-controller-indicted-for-leaving-rodent-poison-in-kindergarten-yard/

NEW ZEALAND: ANTS FOUND ON ELDERLY WOMAN

A 95-year-old women was receiving hospital treatment and was relying on others for her care. Some ants were noticed in her room and they were sprayed with insecticide by staff of the facility. The patient was then visited by a relative shortly afterwards who found ants crawling on the women's face and head. An independent investigation of the incident concluded that the staff took insufficient action to investigate

the problem and did not provide immediate care to the patient. [SLD: sadly the care of the elderly needs improvement all around the world and these incidences, in a developed country, highlights that a lot of work still needs to be done.]

Source: *Scoop* (15/Feb/2021), www.scoop.co.nz/stories/GE2102/S00068/care-of-elderly-woman-after-ants-found-in-her-room-and-bed.htm

SRI LANKA: *WOLBACHIA* PROGRAM TO RECOMMENCE

A program to release *Wolbachia* infected mosquitoes to combat dengue, was suspended for four months due to the COVID-19 pandemic. However, the program will be starting up again and hopefully the numbers of dengue infections will decline soo.

Source: *Daily News* (13/Feb/2021), http://www.dailynews.lk/2021/02/13/local/241503/wolbachia-control-dengue

AUSTRALIA: DOGS POISONED FROM RODENT BAITS

Secondary issues associated with the ongoing mouse plague in eastern Australia continue. Now veterinarians are reporting an increasing number of dogs that are suffering internal bleeding caused by the ingestion of mouse baits. A lot of the poisoning is due to the indiscriminate placement of baits without being positioned in bait stations. Thus pets have ready access to the baits. Plus dogs are eating poisoned mice and suffering secondary poisonings. Symptoms of poisoning may include lethargy, bruising, soft joints, coughing, and blood in urine and faeces, and bleeding.

Source: *Scone.com.au* (12/Feb/2021), www.scone.com.au/rat-bait-poisoning-local-dogs/

AUSTRALIA: WARNINGS OF RODENT-BORNE DISEASE TO RESIDENTS

With the current mouse plague occurring across eastern Australia (see news items below), residents of affected areas are being warned about the possible increase in the rodent borne disease, Leptospirosis. The bacteria is spread via the mouse urine and symptoms may include "kidney failure, jaundice, haemorrhaging of the skin and mucous membranes, meningitis or bleeding in the lungs" and hospitalization may ensue. The disease is treatable with antibiotics if caught early. Further fears for people's health has been raised as the mice are dying in large numbers in drinking water tanks in affected regions. The mice could have received a dose of poison, which could be passed onto the resident, but the dead rodents will contaminate water sources (see second link below).

Source: *Scone.com.au* (10/Feb/2021), www.scone.com.au/rodent-disease-warning/ and *ABC News* (17/Mar/2021), www.abc.net.au/news/rural/2021-03-16/health-concerns-as-poisoned-mice-found-in-water-tanks/13248938

INDIA: GROWING NUMBERS OF DENGUE CASES IN COIMBATORE

In Coimbatore, in India's south, cases of dengue in humans is rapidly on the rise. Already this year some 74 people have been hospitalized with the disease. The authorities are claiming that they are undertaking mosquito control and urging all residents to ensure that they have no mosquito breeding on their premise.

Source: *The Times of India* (10/Feb/2021), https://timesofindia.indiatimes.com/city/coimbatore/growing-mosquito-menace-worries-residents-as-dengue-cases-go-up/articleshow/80776269.cms

INDIA: CONCERN ABOUT RISE IN MOSQUITOES IN DELHI

With warming weather, there are concerns that mosquitoes may become a serious issue. A survey of homes found some 102 cases of mosquito breeding leading to fines being issued. In total some 177 notices were issues by the local government over mosquito infringements. Interestingly, most positive breeding sites were inside the home rather than outside. Plant related containers including vases accounted for the most common mosquito breeding site, followed by water storage containers.

Source: *The Times of India* (9/Feb/2021), https://timesofindia.indiatimes.com/city/delhi/as-mercury-rises-spectre-of-mosquitoes-looms-again/articleshow/80756347.cms

MALAYSIA: COCKROACHES LED TO CLOSURE OF FISH BALL FACTORY

A fish ball factory in Penang was ordered to close down after pests were found contaminating the

food. Cockroaches, flies and centipedes were found in the food and in storage areas along with rat faeces. The company was ordered to close for 14 days and was fined RM4,100 (USD$1,000).

Source: *New Straits Times* (9/Feb/2021), www.nst.com.my/news/nation/2021/02/664322/penang-fish-ball-factory-crawling-centipedes-cockroaches-ordered-shut

AUSTRALIA: HOSPITALISATIONS AFTER USING RODENT BAIT

As per the story below, parts of Australia are in the middle of one of the worst mouse plagues seen for years. Unfortunately there has been an increase in the number of poisonings as a result of people using a bait that contains zinc phosphide. Now several people have been hospitalised. People are now being cautioned and advised not to use this product in the home.

Source: *Liberal Daily* (8/Feb/2021), www.dailyliberal.com.au/story/7116776/residents-urged-to-be-careful-as-mouse-bait-misuse-leads-to-poisoning/

AUSTRALIA: WORST MOUSE PLAGUE FOR YEARS

With the current wet conditions across eastern Australia, mouse populations have exploded. Numbers are so large that population control is now near impossible. Supermarkets in the stricken regions are catching two hundred mice a night while hundreds are being caught in pool filters overnight. The mice are now threatening crop harvests, which have been poor due to ongoing drought conditions. A video in the Daily Mail link below shows hundreds of mice crossing a highway in outback New South Wales. The numbers of mice are so high, they are threatening the food supply for the state (see last link)

Sources: *7News* (7/Feb/2021), https://7news.com.au/news/australia/worst-mouse-plague-in-a-decade-thousands-of-rodents-wreak-havoc-in-rural-australia-c-2110992, *Daily Mail* (8/Feb/2021), www.dailymail.co.uk/news/article-9230761/Shocking-moment-MICE-plague-swarms-road-wild-weather-creates-perfect-breeding-conditions.html, and *The Sydney Morning Herald* (7/Mar/2021), www.smh.com.au/national/of-swarming-mice-and-desperate-men-20210304-p577qz.html

BANGLADESH: FIRE FROM MOSQUITO COIL DESTROYS FOUR SHOPS

One mosquito coil was believed to the cause of a fire that destroyed four shops in the city of Chattogram. It was estimated that the losses totalled around Tk 5 lakh (around USD$6,000). Mosquito coils are well known for starting fires if placed in a high risk location surrounded by flammable items.

Source: *NewAge* (7/Feb/2021), www.newagebd.net/article/129477/fire-from-mosquito-coil-burns-four-shops-in-chattogram

AUSTRALIA: AUD$22,000 FINE OVER COCKROACHES

A popular restaurant in Brisbane was fined AUD$22,000 (USD$17,000). This was the result of health inspectors finding cockroaches in Happy Bowl Vietnamese Kitchen in Sunnybank.

Source: *Courier Mail* (6/Feb/2021), https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiMi7r2zdjuAhUlH7cAHYFRByQQFjABegQICRAC&url=https%3A%2F%2Fwww.couriermail.com.au%2Fquestnews%2Fsoutheast%2Fwould-you-like-roaches-with-that-asian-restaurant-fined-22k%2Fnews-story%2Fd639c9765b66a48c59237bf83de2edbd&usg=AOvVaw1OYA4PClbJtPzqXdmH3riF

AUSTRALIA: INTERVIEW ON ELIMINATING COCKROACHES IN THE HOME

Many in the pest management industry in Australia would know Keith Farrow who longed worked for Rapid Training and has recently set up his own consultancy business. Keith was recently interviewed on the ABC on the methods than can be used to reduce cockroaches in the home. This is well worth a listen.

Source: *ABC* (4/Feb/2021), www.abc.net.au/radio/newcastle/programs/drive/how-to-get-rid-of-german-cockroaches/13122986

INDIA: RISE IN DOG AND CAT TICK-BORNE DISEASE

Veterinarians in Chennai are saying that they are seeing more cases of tick-borne diseases in dogs and cats. The pathogens causing the disease include *Babesia* and *Ehrlichia*, and both cause blood disorders leading to anaemia, with affected animals often requiring transfusions. Dogs will

often have haemorrhaging and will bleed from various parts of the body. Pet owners are being warned to keep a watch for such symptoms in their pets [SLD: perhaps some smart pest management companies will take up tick control as part of their treatment regimens.]

Source: *The Hindu* (4/Feb/2021), www.thehindu.com/news/cities/chennai/spurt-seen-in-tick-borne-diseases-in-dogs-and-cats/article33744480.ece

AUSTRALIA: RODENT CONTROL SUCCESS ON LORD HOWE ISLAND

Lord Howe Island is a World Heritage Listed island off the east coast of Australia. It is home to unique flora and fauna that has been decimated with the introduction of feral pests including rodents. As previously mentioned in the *FAOPMA Magazine*, a rodent eradication program was introduced to the island, which was considered highly controversial by some residents. The program was begun in 2019 with the aim of killing the 300,000 population of feral rats and mice on the island. Now no rodent has been seen for some 15 months and some bird populations have doubled in a very short time. Plus many insects have increased in number and many plants are flowering, something never seen by the locals. The result has exceeded the expectations of the team behind the eradication program. Mice first appeared on the island in 1850 and rats some 68 years later, both species from shipping. This is a terrific result and represents the first eradication program undertaken on an island with permanent human inhabitants.

Source: *ABC* (3/Feb/2021), www.abc.net.au/news/2021-02-02/lord-howe-island-recovers-from-rat-infestation/13111770

NEW ZEALAND: FAMILY AWARDED NZD$5,000

A family in Auckland were awarded NZD$5,000 (USD$3,600) by the Tenancy Tribunal after living in a rental property with a "distressing and frightening" rat infestation. There were also a number of engineering defects that were not corrected prior to the family moving in, which contributed to the penalty.

Source: *Stuff* (3/Feb/2021), www.stuff.co.nz/life-style/homed/renting/124121250/family-awarded-5k-after-living-in-rat-infested-west-auckland-rental

USA: NAME A COCKROACH AFTER YOUR EX AND HAVE IT FED TO AN ANIMAL!

In an almost reverse to the traditional Valentine Day sentiment, a company in the US offered a rather curious deal for the customary day of romance. You could have a cockroach named after your ex-partner and then the roach was fed to an animal. The final demise of your christened insect then happened live on Facebook on 14/February.

Source: *WeAreGreebBay.com* (1/Feb/2021), www.wearegreenbay.com/local5live/name-a-cockroach-or-rodent-after-your-ex-and-watch-it-get-fed-to-an-animal-on-valentines-day/

NORTH AMERICA: TOP BED BUG CITIES

Typically around this time of the year, Orkin, one of the largest pest management companies in North America, releases its list of most infested cities in the US and Canada. The number one most infested city in the US for 2020 was Chicago, up two places upon last year. Next comes Baltimore, Chicago, Washington DC, Columbus, Cleveland, Indianapolis, Cincinnati, Los Angeles, and Grand Rapids. In Canada, Toronto made the number one spot, followed by Sudbury, Oshawa, Vancouver, Winnipeg, St John's, Scarborough, Whitby, Edmonton, and Ottawa. Fortunately (and somewhat surprisingly) Las Vegas, the location of PestWorld 2021, did not even make the top 50 on the list.

Sources: *Orkin USA* (1/Feb/2021), www.orkin.com/press-room/orkin-top-bed-bug-cities-2021 and *Orkin Canada* (25/Jan/2021), www.orkincanada.ca/blog/canadas-top-25-bed-bug-cities/

AUSTRALIA: COUPLE CRASHES BOAT, SPOOKED BY SPIDER

A couple who were travelling in their boat along Hawkesbury River in the outskirts of Sydney, were spooked by a spider. The result was that they failed to watch where they were going and crashed into an embankment. The 32-year-old woman was catapulted several metres and the man also suffered severe injuries that required hospital treatment. It is not known if the spider was injured!

Source: *ABC News* (30/Jan/2021), www.abc.net.au/news/2021-01-30/spooky-spider-leads-to-sydney-boat-crash/13106198

SINGAPORE: RESIDENTS KILLING HELPFUL MOSQUITOES

In Singapore, Project Wolbachia is aiming to reduce the incidence of dengue infections. The project involves releasing male mosquitoes that are infected with an intracellular bacteria. When these males mate with the females, the eggs fail to hatch. Some residents are claiming that mosquito numbers have increased since the start of the project, which is affecting their quality of life. As people are not sure if the mosquito is a deadly female, or a helpful male, all are given equal treatment and promptly killed.

Source: *Today* (30/Jan/2021), www.todayonline.com/voices/project-wolbachia-residents-are-killing-helpful-mosquitoes-which-can-be-nuisance

CHINA: AUTHORITIES PROACTIVE AGAINST MOSQUITO PROBLEM

Authorities in the Shanghai Center for Disease Control and Prevention are undertaking mosquito control in numerous locations in an effort to reduce populations early in the season. The aim was to lower vector numbers prior to the warmer months, thus reducing the risk of a mosquito-borne disease outbreak.

Source: *Shine* (29/Jan/2021), www.shine.cn/news/metro/2101294064/

INDIA: CALL TO SCREEN ALL DOORS AND WINDOWS

Residents in India are being asked to ensure that all windows are doors are adequately screened. This simple non-chemical procedure will help prevent mosquitoes (and other flying insects) from entering the home, thereby reducing the risk of mosquito-borne diseases.

Source: *The Times of India* (29/Jan/2021), https://timesofindia.indiatimes.com/most-searched-products/home-decor-and-garden/utility/mosquito-screens-keep-mosquitoes-at-bay-with-mesh-screens-for-doors-and-windows/articleshow/80571028.cms

AUSTRALIA: NEW TICK-BORNE DISEASE AFFECTING DOGS

A new tick-borne disease that can kill dogs has been recognised in Australia; canine ehrlichiosis. This is transmitted by the brown dog tick, *Rhipicephalus sanguineus*, which tends to occur in the drier parts of the country. The disease was first discovered in May 2020, however more than 300 dogs have tested positive for the disease. It is also spreading south and has now been detected in South Australia. Symptoms of the disease include fever, lethargy, and uncontrolled bleeding. Antibiotics can combat the disease and various anti-tick products on the dog will stop the ticks from feeding on the animal and passing on the disease. Insecticidal applicants can be used to control the ticks in the environment or the home. There are now reports that Australia's native dog, the dingo, is being affected by the tick-borne disease (see second reference below).

Sources: *The Conversation* (28/Jan/2021), https://theconversation.com/protect-your-dog-from-this-new-deadly-disease-outbreak-we-still-dont-know-how-it-got-here-153794 and *Farm Weekly* (12/Mar/2021), www.farmweekly.com.au/story/7164491/first-dingoes-believed-found-with-killer-dog-disease/

INDIA: HIGH MOSQUITO NUMBERS PLAGUE CUTTACK RESIDENTS

In Cuttack on the east coast of India, mosquito numbers are presently at the high level, and annoying residents both day and night. The locals are claiming that the situation has become notably worse over the last month. Typically this is the peak mosquito breeding period, and intensive mosquito control operations are underway using fogging against the adults and chemical treatment of larval habitat.

Source: *Times of India* (28/Jan/2021), https://timesofindia.indiatimes.com/city/cuttack/mosquito-menace-back-to-haunt-cmc/articleshow/80498577.cms

NEW ZEALAND: INTERNET OUTAGE DUE TO RATS

More than 1,000 broadband users in West Auckland lost connection for more than 24 hours in late January. It was found that a rodent had gnawed through a 144 fibre strand cable. Hundreds of power cuts occur annual from

animals chewing through cables, but these creatures end up with a shocking outcome, and it is usually their final act.

Source: *DCD* (28/Jan/2021), www.datacenterdynamics.com/en/news/west-auckland-internet-outage-thought-be-due-cable-chewing-rodent/

AUSTRALIA: WARNINGS FOR ROSS RIVER VIRUS IN NEW SOUTH WALES

Health officials in parts of New South Wales (NSW) are warning the public to take precautions against the mosquito-borne disease, Ross River virus (RRV). RRV causes fever, rashes, joint pain and arthritis, but is non-fatal. The disease can be quite lingering, lasting for many months. Cases have increased by around 250% compared to last year, within inland areas of NSW [SLD: with the La Nina, which is associated with higher amounts of rainfall, it was expected that an increase in mosquito-borne disease would occur.]

Source: *Outbreak News Today* (27/Jan/2021), http://outbreaknewstoday.com/ross-river-fever-cases-up-in-area-of-nsw-69623/

COOK ISLANDS: FEARS OF DENGUE OUTBREAK

A number of people from the capital Rarotonga are reporting dengue-like symptoms, with fears that an outbreak is about to start. As a consequence, the Ministry of Health has begun to fog affected areas. However, confirmation of the people's illness has yet to happen. It was around this time last year when there was an outbreak of dengue virus.

Source: *Cook Island News* (27/Jan/2021), www.cookislandsnews.com/national/health/dengue-like-symptoms-prompt-fears-of-mosquito-borne-illness/

INDIA: MOSQUITO NETS DISTRIBUTE AGAINST MALARIA

In Visakhapatnam in coastal eastern India, bed nets are being distributed to residents in an effort to combat malaria. Some 770,000 bed nets are being given to almost 3,600 villages, via health centres. Training in the use of the nets will also be given.

Source: *Times of India* (26/Jan/2021), https://timesofindia.indiatimes.com/city/visakhapatnam/vizag-admin-starts-giving-out-mosquito-nets/articleshow/80454791.cms

NEW BED BUG LURE OUT OF THE UK

A new bed bug detection device, BugScents™, was released by Vecotech, which is a commercial offshoot of the prestigious London School of Hygiene and Tropical Medicine. It is claimed that the device releases pheromones similar to the aggregation scent of bed bugs. It is claimed that the device will work for up to three months. An extraordinary claim is that the device will detect up to 100% of infestations within four hours. More information can be obtained from www.bugscents.com [SLD: pheromones will only attract bed bugs over a short distance, thus I am very sceptical about the detection claims, however note the careful *wording as even 1% detection is still "up to 100%"*! As always, independent verification of the claims of efficacy need to be confirmed.]

Source: *Mirage* (26/Jan/2021), www.miragenews.com/chemical-attraction-new-pheromone-based-bed-bug-lure-to-help-better-detect-infestations/

INDIA: MANS CASH STORE EATEN BY TERMITES

A man from Gujarat received a shock when his store of 2.2lakh (USD$3,000) in paper money was destroyed by termites within a bank locker. Naturally the gentleman concerned demanded that the bank replace his money. The bank has claimed that they have instituted termite control in the premise, but there is no news yet if the man had his money replaced.

Source: *DNA* (25/Jan/2021), www.dnaindia.com/india/report-gujarat-termites-eat-rs-22-lakh-cash-kept-inside-bank-locker-2869829

SINGAPORE: JURONG POINT RESTAURANT CLOSED FOR TWO WEEKS OVER COCKROACHES

Swensens restaurant in Jurong Point Shopping Centre has been forced to close for two weeks by the Singapore Food Agency, due to the accumulation of 12 demerit points in the one year. The 12 points were accumulated due to a "failure to keep licensed premises free of cockroach infestation". All food handlers will have to retake and pass a basic food hygiene course before they

can return to work.

Source: *Mothership* (25/Jan/2021), https://mothership.sg/2021/01/swensens-jurong-point-cockroaches/

SINGAPORE: NEA WARNS OF ONGOING DENGUE RISK

Amidst the COVID-19 pandemic in 2020, Singapore had the largest outbreak of dengue for the history of their island nation. Cases have now fallen, but not completely disappeared, with some 156 cases a week during mid-January. As a consequence, the National Environmental Agency (NEA) is warning people of the ongoing risk to remain vigilant in their anti-mosquito efforts as *Aedes aegypti* mosquitoes increased by some 8 percent during December 2020. During last year, there were some 35,315 cases of dengue with 29 deaths. This was well above the previous record of 22,170 cases in 2013.

Source: *The Straits Times* (25/Jan/2021), www.straitstimes.com/singapore/health/dengue-still-a-danger-as-aedes-mosquito-population-in-singapore-grows-even-as-cases

MALDIVES: AIM TO CREATE WORLD'S FIRST MOSQUITO FREE ISLAND

Dengue is a serious health threat through all the islands of Maldives as the main vector, *Aedes aegypti*, is well established. As a consequence, outbreaks of this viral disease are common. On the tourist island of Kunfunadhoo, there are attempts to eradicate mosquitoes using a non-chemical approach via trapping. Current control methods largely rely on the use of insecticide applications via fogging, which has an adverse effect on all invertebrates, not just mosquitoes. This in term effects all higher order predators. Furthermore, the mosquitoes are highly resistant to insecticides and thus adult control is becoming increasingly more difficult [SLD: note that Iceland has no mosquitoes, however if successful, Kunfunadhoo would be the first island ever to eliminate mosquitoes.]

Source: *Intelligent Living* (24/Jan/2021), www.intelligentliving.co/kunfunadhoo-maldives-worlds-first-mosquito-free-island/

AUSTRALIA: RODENTS CUT MOBILE NETWORK

In the remote aboriginal community of Pukatja in South Australia, telecommunication services went down for five days meaning that people could not make calls, use internet, or use EFTPOS or ATM machines. It was believe that a rodent chewed through transmission lines. Residents had to travel 40 minutes in order to use the above services.

Source: *ABC News* (23/Jan/2021), www.abc.net.au/news/2021-01-23/call-for-better-remote-internet-after-rats-cause-outage/13072896

CATS AND CATNIP – WHY THE LOVE?

Cats are known to love catnip, in fact they go mad for this plant. The cats will roll over on and rub their face on the plant. Interestingly this behaviour may have a genetic advantage. It turns out that catnip contains a chemical called nepetalactol, which has a mosquito repellent effect. Perhaps this learnt behaviour is a means by which cats protect themselves from mosquito-borne diseases.

Source: *Cosmos* (22/Jan/2021), https://cosmosmagazine.com/nature/animals/catnip-repellent/

ASIAN MOSQUITO FOUND IN CUBA

A mosquito normally found in Southeast Asia, *Aedes vittatus*, was recently found in Guantanamo Bay, Cuba. In this case, molecular evidence suggested that it arrived from the Indian subcontinent. The concern is that the mosquito can transmit viruses such as yellow fever and dengue. It is thought that the mosquito hitchhiked on some human made object such as tyres, and was probably brought in on military equipment.

Source: *DownToEarth* (22/Feb/2021), www.downtoearth.org.in/blog/health/lateral-thoughts-don-t-blame-it-on-the-mosquito-75168

FARTS – A NEW FORM OF TERMITE MANAGEMENT?

The beaded lacewing, *Lomamyia latipennis*, is one of the few insects known to science in which its farts can be deadly. When the larvae of the species comes across termites, it raises its abdomen and releases a toxic vapour that stuns the termites. The larvae then feasts on the

comatose termites. If the termites are downwind, then multiple individuals can be paralysed. What is amazing is that other insects are not affected by the lacewings farts, just the termites [SLD: not really sure if this could be used for termite control, perhaps try eating more beans! If you would like to read more about unusual fart stories in animal, then read Does It Fart? The Definitive Field Guide to Animal Flatulence by Nick Caruson and Dani Rabaiotti.]

Source: *IFL Science* (21/Jan/2021), www.iflscience.com/plants-and-animals/beaded-lacewings-can-take-down-six-termites-with-a-single-fart/amp.html

MALAYSIA: INSECTS USES ITS VICTIMS AS ARMOUR

In Malaysia, an assassin bug, *Acanthaspis petax*, has been discovered that basically sticks the bodies of its prey onto its own back. This apparently macabre trophy actually provides a defence against other would be predators, as it confuses potential attackers. The assassin bug can accumulate up to 20 dead ants on its body.

Source: *RojakDaily* (18/Jan/2021), https://rojakdaily.com/lifestyle/article/11485/this-assassin-insect-found-in-malaysian-jungles-uses-its-victims-dead-bodies-as-an-armour

INDIA: ORDERS ISSUED TO BAN GLUE BOARDS

The Animal Welfare Board of India (AWBI) has issued orders to ban glue boards in the country. The AWBI has written to the Indian Pest Control Association stating that glue boards causes unnecessary suffering and flies against the Prevention of Cruelty to Animals Act. Apparently the AWBI issued a similar order some years back, but the order was not complied with at the time. Now the group is seeking punishments to those that continue to use the glue boards, with penalties including fines and imprisonment. Now glue boards are prohibited from being manufactured, sold, or used. There are also attempts to ban their importation.

Source: *The Times of India* (16/Jan/2021), https://timesofindia.indiatimes.com/city/nagpur/awbi-issues-orders-to-ban-glue-trap-for-rodents/articleshow/80293606.cms

INDIA: MOSQUITO WORRY FOR RANGARAJAPURAM RESIDENTS

Following heavy rains in the Chennai, residents of Rangarajapuram are concerned about blocked drains that have resulted in an increase in mosquitoes. Residents are stating that the local government authority are not clearing the silt out of storm water drains, ensuring that they become blocked during heavy rain. The subsequent stagnant water is leading to a huge increase in mosquito numbers.

Source: *The New Indian Express* (8/Jan/2021), www.newindianexpress.com/cities/chennai/2021/jan/08/mosquito-menace-worries-rangarajapuram-2247033.html

NEW ZEALAND: TRAPPING LEADS TO REDUCTION IN RODENTS ON SUGAR LOAF ISLANDS

Following ongoing trapping on the Sugarloaf Islands on the west coast of the North Island, rats and other predators have reduced to almost zero. The islands are home to around 19 species and some 10,000 birds, including some endangered species. The island is accessible at low tides from the mainland meaning that rats pose an ongoing problem. This is another step towards New Zealand's aim of predator free 2050.

Source: *Stuff* (4/Jan/2021), www.stuff.co.nz/national/300195436/rat-trapping-network-helping-offshore-islands-endangered-seabird-survival

RATATOUILLE THE TIKTOK MUSICAL

You may remember the wonderful Disney movie called Ratatouille from 2007 staring the lovable rat Remy, who aspired to become a renowned French chef. Following crowd funding through TikTik that raised USD$1.5million a musical based on the original film was created. Sadly, the production only ran over 1-4/January/2021, but hopefully once theatres open up again, we may see the play on stage.

Source: *Elle* (2/Jan/2021), www.elle.com/culture/movies-tv/a35111027/tiktok-ratatouille-musical-twitter-reaction/ ■

News from Academia

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

Compiled by Stephen L. Doggett and David Lilly

TESTING SULFURYL FLUORIDE FUMIGATION FOR BED BUG CONTROL

Controlling bed bugs in densely packed belongings and vehicles can be extremely difficult to achieve. One option is to use fumigation, although research in this area has been notably lacking. Scientists from Virginia Tech in the US investigated the efficacy of sulfuryl fluoride (marketed as 'Vikane') against the common bed bug, *Cimex lectularius*. They used vehicles and minivans that were filled to around 85% capacity with books, furniture and other household belongings. Contained bed bugs were placed throughout the items and vehicles. The researchers then placed tarps over the lot and introduced the fumigate, such that 1.9x label rate was achieved. After the required period and aeration, the bed bugs were removed and examined for mortality. All bed bugs were killed regardless of life stage. The use of fumigants may provide a more logistical means of effective bed bug management in densely packed belongings.

Source: *Journal of Economic Entomology* (11/Mar/2021), https://academic.oup.com/jee/advance-article/doi/10.1093/jee/toab033/6168217

MOSQUITOES AND MIDGES UNABLE TO TRANSMIT SARS-COV-2

Many articles have suggested that mosquitoes and other biting flies are unable to transmit SARS-CoV-2, the virus that causes COVID-19, however to date no one had actually tested this. Now a group of researchers from the US has tested the ability of mosquitoes and midges to transmit SARS-CoV-2. The researchers fed the insects blood laced with the virus and none of the mosquitoes or midges tested were able to support the virus and thus are not vectors of SARS-CoV-2.

Source: *Journal of Medical Entomology* (4/Mar/2021), https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjab013/6158874

WHAT'S BITING ME???

This is question often asked by clients to pest managers. But to solve this, you will need the skills of Sherlock Holmes and the patience of Job. Sadly, in many if not most cases, there will be no simple answer found. Recently, the Chief Editor's Department at Westmead Hospital in Sydney, Australia reviewed all the specimens sent to the laboratory over a 30 year period. Note that we are the state reference and *de facto* national reference laboratory for the identification of insects of medical importance. This is the first time anywhere in the world that a medical entomology laboratory has

attempted to review the submissions to their facility over an extended period. The paper was published in early March and can be freely downloaded from the link below. Note there is quite a lot of supporting information including images that highlight the differences between commonly misidentified pests. We hope that everyone in the pest management fields finds this a useful resource.

Source: *Austral Entomology* (3/Mar/2021), https://onlinelibrary.wiley.com/doi/10.1111/aen.12480

INDIA: DENGUE RISK LINKED TO ACCESS TO TAP WATER

A study undertaken in Dehli has identified a link between the risk of dengue virus and the availability of tap water. It was found that those areas that a reticulated water supply had lower levels of dengue compared with areas without the supply. Presumably those without a constant supply of drinking water via taps, hoarded water around the home providing suitable breeding habitat for *Aedes* mosquitoes.

Source: *PLOS Neglected Tropical Diseases* (11/Feb/2021), https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0009024

MOSQUITOES BRED TO BE RESISTANT TO ZIKA VIRUS

Researchers in the US, using gene technology, have bred a line of the Dengue Mosquito, *Aedes aegypti*, which is unable to transmit Zika virus. According to the researchers involved in the study, the character is inheritable so that future generations of the mosquito would be unable to transmit the virus. Large numbers of these genetically modified mosquitoes would need to be bred up and released to see a reduction in viral activity.

Source: *Lab+Life Scientist* (2/Feb/2021), www.labonline.com.au/content/life-scientist/news/mosquitoes-genetically-modified-to-be-resistant-to-zika-908186178

NOVEL MOSQUITO CONTROL; PYRIPROXYFEN IN SUGAR BAITS

Previous research has shown that mosquitoes can transfer the insect growth regular, pyriproxyfen, via their tarsi to larval habitats, thereby adversely affecting developing larvae. This is a process known as 'autodissemination'. It was suggested that perhaps the adult could acquire pyriproxyfen via sugar meals and the insecticide could be released in the faeces. An investigation was undertaken to examine this potential mode of insecticide application. Adult mosquitoes were fed pyriproxyfen laced sugar and the insecticide was found to be excreted for up to 96hours. There was a significant reduction in adult emergence with water tainted with the faeces of pyriproxyfen fed adults. Fecundity and fertility of the adults were also considerably reduced. Now field trials need to be undertaken to see if such effects could be paralleled in the field.

Source: *Journal of Medical Entomology* (28/Jan/2021), https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjaa265/6123314?redirectedFrom=fulltext

HOPE FOR BETTER CONTROL OF MOSQUITO-BORNE DISEASES

A study lead by a team from Australia tested the effectiveness of 'emanators' in the control of *Aedes aegypti*. Emanators are devices that slowly release insecticides, many of these are plastic based units that release the pyrethroid, metofluthrin. By having the emanators in the home, the number of *Aedes aegypti* was reduced by 60% and the biting rate reduced by 90%. The benefits beyond the reported efficacy is that the emanators are fast to deploy, easy to use, low cost, and do not use electricity. These devices are already available to purchase in most parts of the world.

Source: *PLOS Neglected Tropical Diseases* (26/Jan/2021), https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0009036

FACTORS INFLUENCING HOUSE FLY CAPTURE IN ULV LIGHT TRAPS

A research project was undertaken by a researcher from the University of Florida, whereby he examined the effectiveness of ultraviolet based light traps in a supermarket.

Two types of light traps were tested; a Gardner GT-180 and a Gardner MX-360. The latter trap is a large portable unit that is placed on the floor and this captured many more flies than the GT-180 unit that was mounted 2m high on the wall. Using black, compared with white, glue boards resulted in significantly lower collections. The highest collections of flies were from the bakery, followed by the deli. Information derived from this study can be used to maximise fly monitoring operations. Note that the full paper can be downloaded from the link below.

Source: *Journal of Economic Entomology* (18/Jan/2021), https://academic.oup.com/jee/advance-article/doi/10.1093/jee/toaa319/6103839

MOSQUITOES AS AN EARLY WARNING SYSTEM FOR CANCER

Japanese researchers have discovered a means of using a mosquito's powerful sense of smell to detect cancer in patients. The mosquito olfactory cells (i.e. the creature' sense of smell) can detect certain odours that only occur in the breath of a person suffering with cancer. The researchers have developed a system that mimics the mosquito's olfactory cells. The system is very low cost and will hopefully develop into a routine use devices within the next few years.

Source: *Science Advances* (13/Jan/2021), https://advances.sciencemag.org/content/7/3/eabd2013 and *7 News* (19/Jan/2021), https://7news.com.au/technology/science/mosquitoes-can-be-an-early-warning-system-for-cancer-report-finds-c-1987784

THE ORIGINS OF THE INSECTICIDE RESISTANCE ACTION COMMITTEE (IRAC)

Insecticide resistance is a concern for anyone involved in pest management. A basic understanding of resistance is necessary in order to learn how to prevent it happening, but also what to do if resistance is suspected or known to occur. In order to combat resistant, the Insecticide Resistance Action Committee (IRAC) was formed in 1984. The IRAC also developed the Insecticide Mode of Action (MoA) Classification Scheme to help implement insecticide resistance management. A new review was just released that focused on the IRAC and MoA and the entire paper can be downloaded from the link below.

Source: *Pest Management Science* (9/Jan/2021), https://onlinelibrary.wiley.com/doi/full/10.1002/ps.6254?campaign=wolearlyview

CHINA: DETECTION OF TICK-BORNE PATHOGENS

Research was undertaken in the southwest of China to detect spotted fever rickettsia in ticks. This group of rickettsia contain a number that are important human pathogens that can cause serious disease. Some 305 ticks were collected from wild and domesticated animals in Chongqing, Guizhou, Yunnan, and Guangxi provinces, and tested for the rickettsia. A number of rickettsia were found including one that was new to science. At this stage it is not known if it causes disease in humans.

Source: *Journal of Medical Entomology* (5/Jan/2021), https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjaa294/6063444?redirectedFrom=fulltext

NEW MOSQUITO REPELLENT DEVELOPED USING SILICONE OIL

The Japanese cosmetic giant, Kao, has developed a new mosquito repellent containing silicone oil. Unlike most products that actually repel mosquitoes and prevent them from biting, when a mosquito lands on skin covered with the oil, the mosquitoes will rub their legs together an attempt to remove the oil that will immediately cling to their legs. They will then fly off without blood feeding. No statement has been released on the product's effectiveness against other biting arthropods.

Source: *Cosmetics* (5/Jan/2021), www.cosmeticsdesign-asia.com/Article/2021/01/05/Buzzing-research-Kao-develops-new-mosquito-repellent-technology-using-silicone-oil

ASIAN MOSQUITO DOES NOT POSE A RISK FOR ZIKA VIRUS

A study published in the well-known journal

PLOS Pathogens, suggests that the Asian Tiger mosquitoes, *Aedes albopictus*, does not pose a major risk for Zika virus epidemics. The main vector for this virus is the dengue mosquito, *Aedes aegypti*. However, if mosquito populations are high, then it may be involved in viral transmission [SLD: such sweeping statements from authors should always be viewed with a high degree of caution. Different strains of the mosquito can vary in its ability to transmit viruses. Similarly, different strains of virus can vary in its transmissibility as well. Plus there can be viral mutations, as seen with Chikungunya virus, which can lead to be more likely transmitted.)

Source: *News Medical Life Sciences* (4/Jan/2021), www.news-medical.net/news/20210104/Asian-tiger-mosquito-does-not-pose-a-major-risk-for-Zika-virus-epidemics.aspx

KOREA: TESTING MIGRATORY BIRDS AND THEIR TICKS FOR PATHOGENS

A study was undertaken in Hong and Nan Islands, Republic of Korea, to look for potential human pathogens in migratory birds and the ticks that infest the birds. The study was undertaken over 2011-2016. Some 877 ticks were collected in the study, the most common being *Ixodes turdus*. Fifteen pools of the ticks were positive for Borrelia (many of these bacteria are pathogenic to humans) and *Anaplasma* was detected in one pool. The study supports the role of migratory birds for the spread of tick-borne diseases.

Source: *Vector-Borne and Zoonotic Diseases* (24/Dec/2020), www.liebertpub.com/doi/10.1089/vbz.2020.2629

BANGLADESH: RAINY DAYS AND INCREASED DENGUE

A recently published report analysed climatic factors against hospital admissions in patients with dengue disease in a high incidence area of Dhaka, the capital of Bangladesh. It was found that dengue virus is transmitted throughout the year, however cases rise with a higher number of rainy days. Such information can be used to better time the release of public health warnings.

Source: *International Journal of Environmental Research and Public Health* (18/Dec/2020), www.mdpi.com/1660-4601/17/24/9506

CHINA: WIDESPREAD INSECTICIDE RESISTANCE IN *AEDES ALBOPICTUS*

The Asian Tiger mosquitoes, *Aedes albopictus*, is an important vector of a variety of viruses including dengue. Unfortunately, insecticide resistance is a major impediment for the control of this insect. A research project was undertaken in the Hainan Province of China to examine the level of resistance in five field populations of *Aedes albopictus*. Bioassays of larvae found that all populations were resistant to the pyrethroids, while adult populations were either resistant or highly resistant to six insecticides tested (which included deltamethrin, permethrin, cyfluthrin, propoxur, malathion, and DDT). Test demonstrate that the mosquitoes exhibit a range of resistant mechanisms including knockdown and metabolic resistance.

Source: *Pest Management Science* (10/Dec/2020), https://onlinelibrary.wiley.com/doi/full/10.1002/ps.6222?campaign=wolearlyview

CHINA: SUCCESSFUL MALARIA CONTROL IN CHINA

Malaria was once a major health problem in China. With the implementation of vector control, case numbers reduced dramatically. In 1970, there were 4,333 cases per every 10,000 people. With the introduction of integrated malaria control, cases numbers dropped to 0.23 per every 10,000. Since 1997, there have now been no cases at all. This has been a hugely successful program, however the risk continues as the vector is still present in the area, and imported cases leading to local transmission may still occur. Another useful paper on the malaria risk at the China/Myanmar border can be found at: https://idpjournal.biomedcentral.com/articles/10.1186/s40249-017-0322-2

Source: *Malaria Journal* (23/Nov/2020), https://malariajournal.biomedcentral.com/articles/10.1186/s12936-020-03501-4 ■

Events Calendar*

Upcoming pest management events from across the globe

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

AEPMA Conference 2021
22-24 September 2021
Gold Coast, Australia
https://aepma.com.au/conference

FAOPMA-Pest Summit 2021
6-8 October 2021
Philippines

PestWorld 2021
2-5 November 2021
MGM Grand Hotel, Las Vegas, US
www.pestworld2021.org

Parasitec
17-19 November 2021
Paris, France
www.parasitec.org

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!

Stephen L. Doggett

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

Stable Fly (*Stomoxys calcitrans*)

A fly that can inflict very painful bites

David Lilly

The stable fly (Stomoxys calcitrans L.) is a serious nuisance pest that affects both humans and animals but which is primarily a major cause for productivity and economic losses in the livestock industry. The genus *Stomoxys* contains 18 different species and is distributed worldwide, with *S. calcitrans* being the dominant pest species across most temperate regions. Adult stable flies appear superficially similar to *Musca domestica* but can be easily distinguished through the presence of their protruding proboscis and through possessing a shorter and broader abdomen. They are parasitic blood-feeders and possess specialised mouthparts that are elongated, sclerotized, and with the labellum containing several rows of minute teeth that aid with rasping and penetration of skin. Female flies lay their eggs in organic and vegetatively rich substrates, including areas like compost heaps, decaying hay or straw piles, and silage. High levels of moisture and fermentation of the vegetation matter adds to the attraction for stable flies and promotes larval development. As with many large flies, development from egg to adult takes between 10-30 days and is temperature dependent.

As noted above, stable flies are a major nuisance pest for animals and commonly cause serious issues with cattle, horses, dogs and zoo animals. It has been estimated that over US$2 billion is lost annually from the US cattle market due to stable flies, with them presenting as a particular challenge around stable yards and feedlots. The bite from stable flies is known to be intensely painful and can cause a range of effects with cattle including: reduced milk production, weight loss, and injury or heat stress due to 'bunching'. Significant efforts are focussed on stable fly prevention and keeping the population below a known threshold of 6 flies per animal before the flies cause major economic impacts. Additionally, stable flies can injure and irritate horses, and have been known to cause serious injuries to the ears of dog. Fortunately, though, stable flies are not a major vector of animal or human pathogens, except for being an intermediate host of *Habronema microstoma*, a nematode which causes granular dermatitis in horses. Research is ongoing to determine if the flies may play some part in the mechanical transmission of other pathogens if rapid interval feeding has occurred between multiple hosts.

Management of stable flies in the urban

environment is largely similar to that of most other large pest flies, with a keen focus on harbourage and breeding site reduction or treatment, and exclusion with physical barriers and screens. Insecticidal treatment, including with insect growth regulators, may be beneficial if breeding sites cannot be eliminated, as with targeted treatments to walls and ceilings where the flies harbour before attacking a host. Sugar-based baits can be useful, as with trapping or electrocution devices at or near building entry points. Once inside, glue board-based UV traps can be especially effective, particularly if combined with the use of an attractant. Management in agricultural settings may involve a range of other methods including animal dips, insecticide-impregnated ear tags, and various spot treatments, in addition to the same management approaches noted above but implemented on a larger scale.

Suggested reading:

Taylor, D. B., Moon, R. D. & Mark, D. R. (2012). Economic impact of stable flies (Diptera: Muscidae) on dairy and beef cattle production. *Journal of Medical Entomology*, 49(1), pp 198–209, https://doi.org/10.1603/ME10050

Gulmahamad, H. (2011). Flies, gnats & midges. In A. Mallis, S. A. Hedges, & D. Moreland (Eds.), *Mallis Handbook of Pest Control. The Behavior, Life History, and Control of Household Pests* (pp. 969-1045). The Mallis Handbook Company: Richfield, Ohio. ■

Dr David Lilly is a Lead Entomologist for Ecolab's Global Pest Elimination – RD&E Division, and Associate Editor of the FAOPMA Magazine.
Email: david.lilly@ecolab.com

Name This Pest!

Find out what this is in the next edition

Stephen L. Doggett

Hint: What could this spider-like beetle be?

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

Then why not share all this new stuff with the rest of the World!

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.

CONTRIBUTION GUIDELINES

Contributions are to be in Microsoft Word. **DO NOT EMBED IMAGES**, send as separate files (see below). For conference flyers and announcements, Adobe PDF format is acceptable.

CONTRIBUTION FORMAT

Title (3-10 words): provide a succinct but eye catching title.

Summary: provide a short summary of the submission in no more than 20 words

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.

Images and Figures: (*as noted above, do not embed in Word files*). Images are to be full colour and jpg format. If the file size is more than 5MB, then compress the image (i.e. decrease image quality in a photo editor such as Photoshop). Please send several images, but usage of the images will be dependent on publication space. Include a short caption describing the images/figures.

Copyright: it will be assumed that you own the copyright of the information and images submitted, or have written permissions to use these**. Failure to adhere to international copyright laws is your responsibility**. The Editors will only use your information and images for the submitted article, unless otherwise requested. However, articles may reappear online, in print, or in other media. They may be translated and then reprinted in the respective FAOPMA member newsletters.

Acknowledgments: include any potential conflict of interests and sources of funding (if relevant). If acknowledging colleagues, include their full name, position, company or employer, city and country.

Language: English. Write in plain language and avoid complex scientific terms. Avoid dot points and use correct grammar (send to a professional editing service if in doubt).

Galley Proofs: for articles and larger manuscripts (of more than one page) a galley proof of the typeset article will be sent to authors for review. Please annotate the PDF and return to the editors within 48 hours. A nil response will be seen as acceptance of the manuscript.

Review: if the Editors are in doubt about the quality of a submission, then the manuscript may be sent for external peer review. Such reviewers will remain anonymous to the authors.

Access and Sharing: authors are permitted to make their paper available on any platform, such as ResearchGate.

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 the FAOPMA family

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)

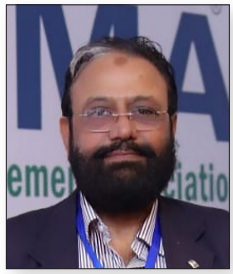
Mr. Won Soo HONG studied agricultural chemistry at the Konkuk University in Seoul. He is the founder of Pestco Co.,Ltd in 1984 and has been the representative until today. In 1999, he became a director of KPCA(Korea Pest Control Association) and from 2015 he has been the President of KPCA. Mr. Won Soo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



Mr. Irfan Fiaz Ali Akbir
Structural Pest Management Association of Pakistan (SPMA)

Irfan Fiaz is the co-founder of the SPMA and C-SHINE Group, where he is the President of the former and CEO of the latter. Irfan is a pest management professional with broad experience in both high tech and traditional pest management in multi-cultural multi product businesses in leading food and pharma companies in Southeast Asia and Middle East.

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.

ADVERTISING RATES 2021

The *FAOPMA Magazine* is the official publication of the Federation of Asian and Oceanic Pest Managers Associations (FAOPMA).

FAOPMA is a non-profit organization established in 1989 by members from Asian and Oceanic countries to promote and develop the professional pest management industry throughout the region.

FAOPMA is the largest pest management association in the world and responsible for helping to ***protect the lives and homes of over 4 billion people***!

The ***FAOPMA Magazine*** is a free full colour, quarterly published e-journal. The ***Magazine*** is edited by internationally renown researchers in the field of urban and medical pest management. The Magazine is widely distributed in the region and to other associations across the world. A special introductory advertising rate is available for 2020:

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