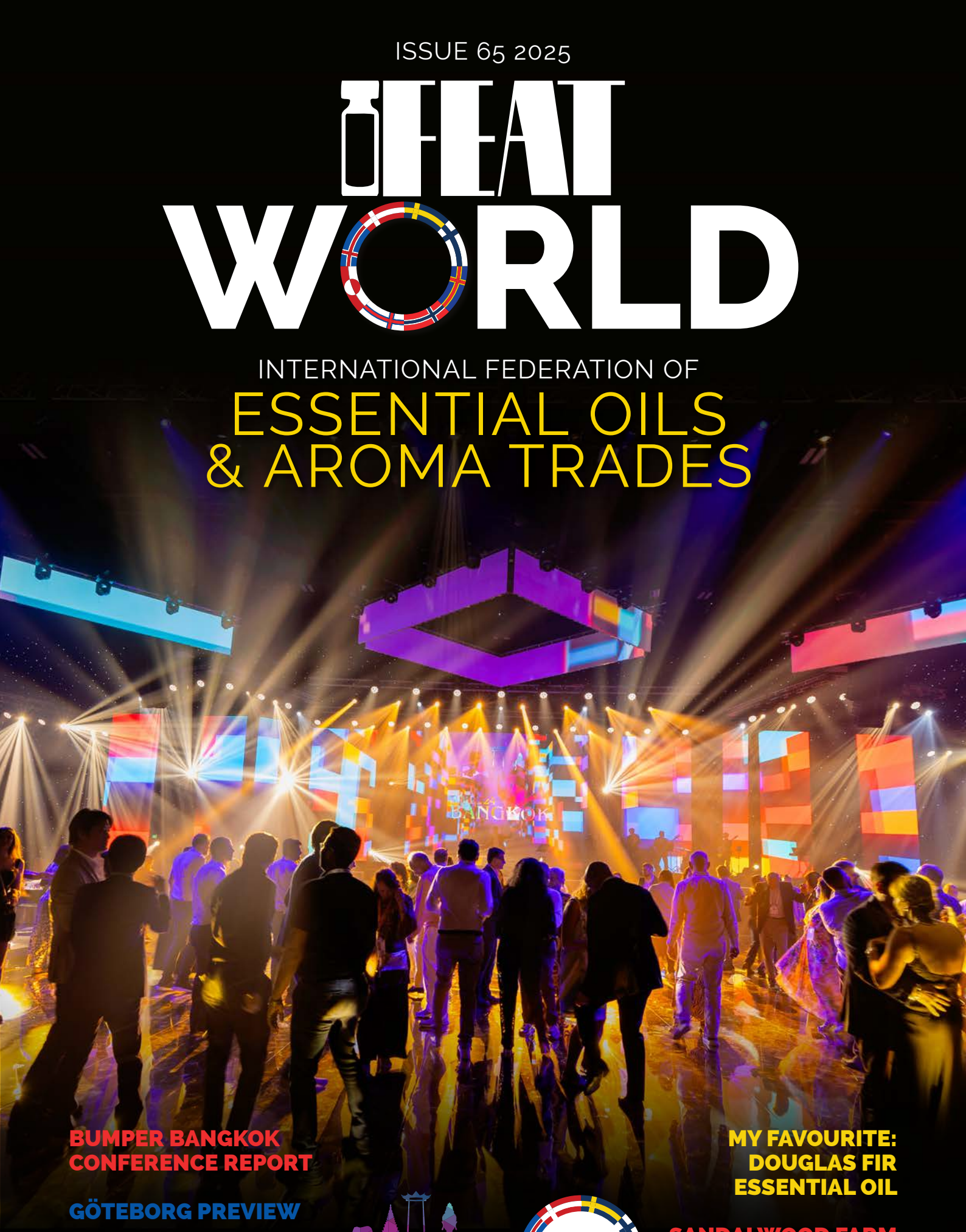
ISSUE 65 2025

IFEAT WORLD

INTERNATIONAL FEDERATION OF
ESSENTIAL OILS
& AROMA TRADES



BUMPER BANGKOK CONFERENCE REPORT

GÖTEBORG PREVIEW

GREEN TECHNIQUES FOR ESSENTIAL OIL ANALYSIS

IFEAT 2024 BANGKOK

IFEAT 2025 GÖTEBORG

MY FAVOURITE: DOUGLAS FIR ESSENTIAL OIL

SANDALWOOD FARM TOUR REPORT

AND MORE!

Notes from the Chair

By Catherine Crowley
Chair of the IFEAT Executive Committee

A New Year for us! The year is now fully underway, and the Federation has been very active in planning new areas that serve our Membership, our industry, and the broader global community.

I remain very proud of my fellow Directors on the Executive Committee, and the Staff and Consultants who empower us to serve in bigger ways and keep all projects moving forward at the same time.

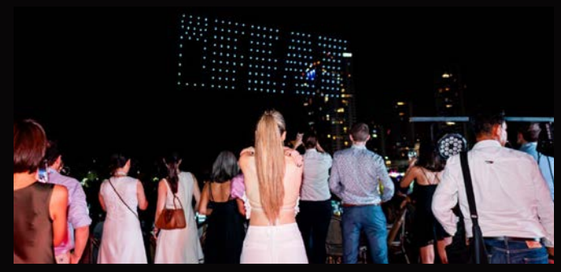
Bangkok – We Were There!

Over 1,760 attendees came together from 64 different countries to experience something unique, exciting, and on a new level for our Conferences. The Welcome Reception was geared towards taking us back to our youth! Our team created a setting next to the Conference Hotel that resembled a high-end amusement park. With a Ferris wheel, funfair-style games for those of us with competitive natures, and indoor and outdoor spaces – the relaxed and fun feel of the evening was a backdrop to great food and warm greetings and exchanges with fellow colleagues.

The Tuesday night IFEAT Dinner took place on a yacht sailing down a moonlit Chao Phraya river, where guests enjoyed great food, live music and dancing, and an unexpected close to the evening with 300 drones providing a light show over the water that ended with drops from an essential oil bottle falling through the sky. Not soon forgotten.

The Closing Banquet on Thursday night maintained the 'wow' factor for this Conference. The large-scale Thai cultural performances mesmerised guests until the post-dinner dancing began and with a collective sense of an amazing week, we rounded off our time together in Thailand.

All of this was the backdrop to a venue that provided all that was needed for compelling speaker presentations, an expanded exhibition space, and more than enough meeting space for our ongoing meetings that are the real nexus of the IFEAT Conference week. A shout out to the two Conference Chairs – Dr Geemon Korah and John Nechupadom – along with IFEAT's Events Manager Shaehzad and the great staff team involved, the Conference Committee and all others that helped pull together a time that was fondly described by many as 'epic'.



IFEAT illuminates the night sky at the end of a special IFEAT Dinner.

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The IFEAT Executive Committee in Bangkok.

Protect Essential Oils – Advocacy & Regulatory Activity

We are hard at work since early this year. For developments in the European Union (EU) – where our focus is at present – the new members of Parliament are now seated, so the mandate for the next four years is in place.

Our priorities for this year are:

- Confirmation of the derogation granted in the CLP Regulation
- CLH classification proposal for tea tree oil and p-cymene
- REACH targeted Revision
- Evaluation of the Cosmetics Products Regulation (CPR)

The mapping plan for this work has been laid out accompanied by a timeline for the activities that will be associated with our work in these areas. IFEAT is pleased to be working this year with the assistance of NOVE – the Brussels-based consultancy with existing expertise in the current regulatory environment in Europe – along with Charles Laroche, who joined the Advocacy team last year as a fantastic resource for this work.

The EFEO-IFEAT Scientific Platform has continued to expand its work to secure the derogation for essential oils and their related products under the recent revision of the CLP regulations involving MOCS (More than One Constituent Substances).

Over the next three-to-four years, we will be working to access and gather data and testing results that can be compiled to ensure this exception remains in place. Both IFEAT and EFEO seek to work with other industry partners in this work, and steps are underway to establish the additional funding required for each step along the way.

We will be providing further information on these developments on different platforms. The work is collaborative and important.

We achieved an initial success last year and will be building on that further going forward!

Let's Go South – It's Time for Argentina

IFEAT's 2025 Argentina Study Tour will be happening from 6-12 April, taking delegates from Buenos Aires, through to Saltas, Cafayate, and Tucumán. Citrus is an important product in our industry and the Tour will give participants a chance to see growing areas, production facilities and different aspects of citrus production in these areas.

As with all IFEAT Study Tours, the chance to network, learn new aspects of the industry and have new experiences in beautiful places are unique aspects of these Tours. The last IFEAT Study Tour in Latin America was 13 years ago to Brazil and Paraguay, so it's certainly time to return to this expansive region.

Sergio Dávalos, a member of IFEAT's Executive Committee and the Chair of the Tour's Local Organising Committee, commented to me recently: "We are looking forward to receiving more than 50 delegates from 20 countries. Let's travel around the country of asado, maté, gauchos, friendship and football, and explore our rich history of essential oils as we go!"

Sergio Dávalos announced the Argentina Study Tour during our Bangkok Conference.

IFEAT 2025 Göteborg – The Nordic Nexus

Make your plans to see us in Göteborg! Landing for the first time in this part of the world, this year's IFEAT Conference will explore the intersection of innovation, sustainability and global market trends in the Nordic region.

Coming off the heels of a fantastic Conference last year, this year's gathering will have first-ever features, an exciting line up of speakers, and unique events that will be sure to create more IFEAT memories for all of us attending. Remember that even if you are not an IFEAT Member, you can still join us from 14–18 September in Göteborg to create lasting business relationships, and take a further step into the broad family of IFEAT.

ICATS
International Centre for Aroma Trade Studies

ICATS – Growing to New Heights

The IFEAT Education Team has been intently focused on developing the ICATS Online Learning Platform to a new level of industry focus and accessibility. Updates include multimedia resources such as videos and podcasts – and to support students further, the Platform offers dedicated tutor support that is readily available.

Because registration is available for one unit at a time, many of us will be able to think of staff or work colleagues that can benefit from this coursework. Offering courses at several different levels for flavour, fragrance, regulatory knowledge and more, this online Learning Platform is set to continue to expand and increase its significance for further professional development for many in our industry.

Visioning for 2025

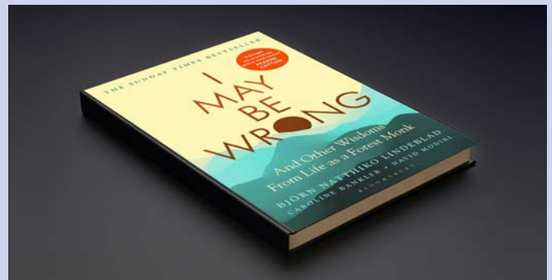
Have you done yours yet? It's still Q1 – and it's never too late! I had done mine mentally on 1 January while out on a walk, but only sat down to write them recently. Writing our aspirations, goals, and business and internal visions for the year is different than just thinking about them.

For all of us, along with our personal goals, let's consider including more kindness, more compassion and an increased sense of reaching out to others to form common bonds to achieve what we want to achieve. To say "we do it better together" continues to be an understatement! Let's ask for more opportunities, friendships and meaningful adventures. For me – I'm proud that we continue to move the Federation forward in a way that provides more of these each year.

Keep joining us on this journey – you won't be disappointed!

Keep well and look after each other.

Catherine



Recommended Reading:

I May Be Wrong... And Other Wisdoms From Life as a Forest Monk

by Björn Natthiko Lindeblad.

This is a current read of mine which seems especially relevant for us. The author is from Sweden and spent 17 years in Thailand at a Forest Monastery. I found this book in the small bookshop at the Göteborg airport – as I was leaving our EC meetings in February!

Get ready for the Nordic Nexus

Registration for the IFEAT 2025 Göteborg Conference opened in March, so it's official – the countdown has truly begun! Here are some of the new things to expect from this year's Conference of firsts.

The IFEAT Conference this year will, for the first time, take place in the Nordic region and in none other than the beautiful city of Göteborg on the west coast of Sweden.

This year's Conference theme, the Nordic Nexus, recognises and celebrates not only the city of Göteborg and the country of Sweden, but the progressive values and spirit of sustainable innovation that permeate throughout the Nordic region.

It's going to be a Conference of firsts for IFEAT – and we're delighted to share some of them here.

Keep up-to-date with the latest Conference news at **conference.ifeat.org**.

"September is one of the best months to visit this region. You can expect stunning nature with the archipelago close to Göteborg and also swimming in the ocean. Göteborg has great restaurants and is a quite walkable city – as long as you look out for the trams!"

Meet your Conference Host: Catarina Rolfsdotter-Jansson

We're excited to announce Caterina Rolfsdotter-Jansson as the host for our 2025 Conference.

Catarina's extensive experience in journalism, her dedication to sustainability and specialist facilitation experience in sustainability-focused events will undoubtedly enrich the conference experience for all our attendees.

Catarina is also a Swedish national, and so perfectly placed to welcome our Conference to Sweden and the Nordics for the first time in our history!

What is your background and how did that help you to accept the offer to host the IFEAT 2025 Göteborg Conference?

I have been a journalist since the late 1980s and work as moderator and TV broadcast host focusing on sustainability. I have written a lot about essential oils and use them myself and appreciate the commitment to sustainability that IFEAT has.

What are your key interests in relation to our industry and the broader industry landscape?

I am primarily interested in two of the three aspects of sustainability in this industry; environmental and social sustainability and how your industry can strengthen your capabilities from an already strong position.

How do you think IFEAT coming to Sweden could affect the regional industry?

I am convinced that this event can increase the interest from companies (and, if reaching media, also the public) in the benefits your industry's products hold.

For our delegates travelling from all around the world, what can they expect from Göteborg and the Nordic region?

September is one of the best months to visit this region. You can expect stunning nature with the archipelago close to Göteborg and also swimming in the ocean. Göteborg has great restaurants and is a quite walkable city – as long as you look out for the trams! People are friendly and everyone under 80 speaks English, so don´t be afraid of interacting with the locals.

What would you hope our delegates take home with them from Sweden?

We have a long tradition of protecting our nature, with our unique "Freedom to Roam" legislation. We like to keep it simple and natural when it comes to interior design as well as scents and flavours. I think the Swedes' strong tradition of many of us owning a small country house and going hiking in nature on the weekend, of steering away from plastic is something that will resonate with the delegates. And we love entrepreneurs and family-run businesses, which I understand many of the IFEAT members are.

Join the field trip to Borregaard

On Friday 19th September, a limited group will journey to Sarpsborg, Norway, for an exclusive visit to Borregaard's cutting-edge biorefinery.

This is a chance to observe, firsthand, the intersection of sustainable practice and advanced technology, as attendees observe the transformation of Norway spruce (*Picea abies*) into vanillin.

Participants will gain insight into the processes that are shaping the future of aroma and flavour production. The day will include a cross-border journey from Göteborg, and a chance to connect with industry peers in a new setting beyond the Conference environment.

This is an excellent opportunity for those interested in the practical application of biorefinery technology. Spaces are very limited – and limited to one Delegate per Member Company. Visit **conference.ifeat.org** to register your place today!

Daniela Tablado

Stanley Nyoni

Rise and Reflect

IFEAT Göteborg 2025 will introduce the morning "Rise & Reflect" sessions led by expert facilitators Stanley Nyoni and Daniela Tablado – a unique addition designed to set a rejuvenating and empowering tone for each Conference day.

This series will blend leadership insights and practical tools to inspire attendees to embrace sustainable and innovative leadership. It reflects the conference's theme by connecting personal growth to global sustainability.

The 7:30-8:30am "Morning Movement" sessions will offer a refreshing start to each day, combining reflective practices with actionable strategies to drive professional and personal growth. It will be a cornerstone for engaging participants and creating meaningful connections throughout the event.

Day 1: The Mindful Leader
Cultivate presence, clarity, and mindfulness to elevate your leadership impact. Practical tools for enhancing self-awareness, followed by group reflections on deepening leadership presence.

Day 2: Vision for the Future
Align your leadership vision with sustainability goals and create a roadmap for the future. Guided visualisations and visioning as strategic tools.

Day 3: Collaborative Communities
Build empathy and collaboration to foster inclusive leadership and resilient teams. Practice deep listening and collaborative problem-solving to create empowered team dynamics.

Day 4: Building Resilience
Strengthen inner resilience through mindful movement and practices designed to navigate complex challenges. Develop strategies for thriving in uncertainty and stress, ensuring continued growth as a leader in sustainability.

IFEAT 2024 Bangkok Conference: From Asia to the World

A record-breaking IFEAT Conference in Bangkok put the spotlight on Asia. Simon Frost reports.

From Sunday 10th to Thursday 14th November, the global essential oils and aroma trades industry convened at Bangkok's luxurious Marriott Marquis Queen's Park hotel. As Thailand's vibrant capital sweltered in 34°C heat and 60% humidity, more than 1,700 delegates from 64 countries made the IFEAT 2024 Bangkok Conference its largest yet.

Sunday night saw the Welcome Reception at the neighbouring EM Yard event space, where a spectacular funfair experience awaited a buzzing and bustling crowd, recently landed from all corners of the globe. A giant ferris wheel served as the focal point of a colourful scene replete with funfair games, food stalls and bars, as excited attendees gathered in anticipation of the coming days. The high production of this year's Reception set the bar high for what promised to be a Conference of ambitious scale.

The Conference programme opened the following morning as returning host Ralph Cochrane gave an enthusiastic welcome, acknowledging first-time attendees and returning participants from the 2023 Berlin Conference, while expressing gratitude to the 21 sponsors and 40 speakers and panellists to come. Cochrane also drew attention to the event app and a unique photo service being used for the first time, harnessing AI to identify and send attendees professional photos of themselves from the event to keep and share as they wish.

Co-Chairs set the stage

Dr Geemon Korah and John Nechupadom, co-Chairs of the IFEAT 2024 Bangkok Conference Committee, took the stage to elaborate on the conference theme, 'From Asia to the World'.

They emphasised the shifting landscape of the essential oils and aroma industry, with Asia's growing power in manufacturing, consumption, and economic influence. The co-Chairs highlighted the impressive scale of the Conference, the coming post-Conference tour, and the introduction of new networking opportunities such as the Young IFEATians event and IFEAT by Night poolside parties. They even revealed that delegates could recharge throughout the busy Conference with a free massage.

Beyond the Conference itself, the co-Chairs underscored IFEAT's year-round efforts, highlighting its scientific platform, advocacy, education, and socio-economic initiatives, and encouraging attendees to engage with the IFEAT Secretariat and fellow participants throughout the year.

John Nechupadom and Dr Geemon Korah

Delegates enjoy the funfair-themed Welcome Reception

Keynote: a journey through Asia's influence

Kedar Vaze, a master perfumer and Group CEO of Keva, delivered the keynote presentation, taking the audience on a journey through Asia's historical and modern influence on the perfumery industry.

He began by tracing the rich heritage of essential oil use in Asia, from India's Ayurveda to traditional Chinese medicine, emphasising therapeutic properties alongside fragrance. He then charted the evolution of modern perfumery, from its European origins using essential oils to the introduction of synthetic aroma chemicals and the rise of biotechnology.

Vaze highlighted Asia's emergence as a major hub for aroma chemical production, driven by factors like abundant labour and advanced infrastructure. He presented a case study on geranium oil production in India, demonstrating how tissue culture technology can standardise natural ingredients and offset geographical variations.

The address delved into the challenges and opportunities facing the industry. Vaze discussed the inherent variability of natural ingredients, the need for better testing and standardisation, and the impact of geopolitical and regulatory factors on availability.

He also touched on the potential of biotechnology in producing precursor molecules, and the limitations of biosynthesis in replicating the complete profile of essential oils. Vaze expressed concerns about the EU's hazard-based approach to regulating complex natural substances, arguing for a risk-based assessment instead. He urged Asian countries to lead the way in crafting regulations based on their long history of traditional natural use. On synthetic aroma chemicals, Vaze acknowledged the regulatory pressures driving innovation, particularly in allergen-free and non-CMR (carcinogenic, mutagenic, or toxic for reproduction) fragrance compounds. He encouraged the industry to advocate for a risk-based approach and to seize opportunities for designing safer molecules using green chemistry and AI-assisted tools.

Vaze concluded by emphasising the growing consumer demand for natural, organic, and sustainable ingredients, highlighting the importance of ethical sourcing, environmental responsibility, and fair practices. He also discussed the role of technology in transforming the fragrance industry, from improved extraction techniques to biotechnology solutions. Vaze pointed to the rising trend of dual-use aroma molecules with therapeutic benefits and the increasing focus on renewability and carbon footprint. He expressed optimism for the industry's future, particularly in Asia and Africa, with their large consumer base and traditional links to aroma.

Economic outlook

Next, Kelvin Tay, Chief Investment Officer of UBS Global Wealth Management, provided a detailed analysis of the global economic landscape, focusing on the challenges and opportunities for Asia, as well as the impact of the recent US elections.

Tay discussed the US economy's current strength, with low unemployment and decreasing inflation, but also highlighted signs of weakness in commercial real estate and rising credit card delinquency rates. He predicted continued growth in the US equities market, driven by rate cuts and a shortage of equity supply.

However, he also noted the disconnect between the strong economic data and public sentiment, citing concerns about home affordability, immigration, and inflation as key factors influencing the election results. Tay analysed the potential impact of the new US administration's policies, including deregulation of the financial industry, increased tariffs, and a shift in the financing burden of the Russia-Ukraine war towards Europe. He expressed concerns about the sustainability of the US dollar's overvaluation, given the high fiscal deficits and rising debt levels.

Tay discussed the challenges facing emerging markets and Asia, particularly in the context of potential trade escalations and increased tariffs. He highlighted Vietnam's vulnerability due to its high trade deficit with the US, while noting China's resilience and its growing dominance in sectors such as electric vehicles and consumer electronics. Tay also discussed the Chinese economy's current slowdown, emphasising the need for further government stimulus to address the housing market slump and high unemployment rates. He expressed optimism about India's long-term growth potential, but also acknowledged the constraints posed by political complexities and recent excessive monsoon rains.

Addressing global concerns

Tay's presentation was followed by a Q&A session, where he fielded questions on a range of global economic concerns. He discussed the potential for currencies like the Indian rupee and Chinese yuan to challenge the US dollar's dominance, particularly in the context of central bank digital currencies (CBDCs). He analysed the economic and political consequences of increasing natural disasters and the need for government intervention to mitigate climate change's effects. Tay also explained why degrowth is not a feasible option for most Asian economies at their current stage of development and discussed the potential for continued growth in India, while acknowledging the challenges posed by political complexities and the need for further economic reforms.

Kedar Vaze

Kelvin Tay

AGM and Business Session

The IFEAT 2024 Annual General Meeting and Business Session marked a year of significant growth, impactful initiatives, and continued dedication to the essential oils and fragrance industry. IFEAT President Ramon Bordas chaired the formal proceedings, guiding members through a productive agenda.

The meeting commenced with the adoption of the Executive Committee's report and accounts for 2023. The reappointment of Menzies LLP as auditors for the coming year, with remuneration to be fixed by the Executive Committee, was also unanimously approved.

Elections of IFEAT Directors to the Executive Committee saw Robby Gunawan of Indesso Aroma, Indonesia, and John Cavallo of Thornhill Consulting, USA, join the Committee. Susumu Tominaga was re-elected, though he was unable to attend due to health reasons, and the assembly wished him a speedy recovery. The meeting also acknowledged the retirement of Michael Torre from the Executive Committee after 15 years of dedicated service. His contributions, particularly as Chair of the Education Committee and later the Membership Committee, were lauded, with special mention of his work on educational courses, new member initiatives, and support for the IFEAT staff.

Mr Bordas then confirmed the current elected Executive Committee members, highlighting the diverse global representation and expressing gratitude for their unwavering commitment. He also paid tribute to two founding members of IFEAT, Richard C Pisano and Jose Luis Adrian, who had recently passed away. Pisano's vision in transforming Citrus and Allied Essential Oils, his service on industry boards, and his long-standing involvement with IFEAT were remembered with respect. Adrian's role in IFEAT's foundation, his leadership as Chairman, and his contributions to the Federation's growth were also commemorated.

Following the AGM, Catherine Crowley, Chair of the IFEAT Executive Committee, presented a comprehensive review of the Federation's activities in 2023. She emphasised IFEAT's continued growth, with 60 new members joining, bringing the total to 672 companies.

The Berlin Conference, held in October 2023, proved to be the largest IFEAT Conference to date, with over 1,600 attendees. Its theme, "*Trade, Tradition, Modern Spirit*", resonated with delegates, and the programme featured insightful speakers, including a member of the European Parliament, Maria Spyraki MEP, who addressed regulatory developments in the EU. The Conference also saw Matthias Vey receive the Medal Lecture and Klaus-Dieter Protzen awarded the Founder's Award. Crowley commended the Conference Organising Committee, led by Jens-Achim Protzen, and the IFEAT staff.

IFEAT's commitment to education was evident in its support for existing programmes and the development of new initiatives. The acquisition of ICATS (International Centre for Aroma Trade Studies) in early 2023 has enabled IFEAT to enhance online learning opportunities and expand its educational reach through collaborations with universities and institutions.

Advocacy work remains a priority, with IFEAT actively engaged in addressing legislation that could negatively impact the essential oils industry. The focus is on the revision of the CLP (Classification, Labelling and Packaging of chemicals) regulation, ensuring a derogation for essential oils – the "Protect Essentials" campaign raised public awareness of these issues. IFEAT also worked diligently to address the proposed reclassification of tea tree oil by the European Chemicals Agency Risk Assessment Committee (ECHA RAC).

The IFEAT-EFEO scientific platform plays a crucial role in compiling scientific data to support the safety of essential oils. The Federation's scientific endeavours also included the Plant Protection Products (PPP) pilot project, which investigated agricultural residues in essential oils. Initial findings were presented at the Bangkok conference (see p.16-17), with a full report due in 2025. IFEAT continues to support the work of RIFM (Research Institute for Fragrance Materials) in safety evaluation and participates in the G4 Heads of Associations group to ensure global coordination on industry concerns.

Ms Crowley concluded her report by thanking the Executive Committee, staff, consultants, and Members for their contributions. She highlighted the dedication and volunteer spirit of the Executive Committee. "It's an exciting time, and I feel very fortunate to be involved and help steer the work of IFEAT", she said. "We have great colleagues – I think it's part of the reason why people are willing to put in what they do – because the Executive Committee is an amazing group of people; inspiring, supporting each other, and really helping to do everything possible to help grow and support the industry".

Education Update

The Education Update session effectively showcased IFEAT's dedication to nurturing future leaders in the flavour and fragrance industry through its support of innovative educational programmes.

Alan Brown, Chair of IFEAT's Education Committee, delivered a comprehensive report on ICATS (International Centre for Aroma Trade Studies), highlighting the comprehensive curriculum rewrite undertaken by Lindsay Smith and Claire Langman, focusing on clarity, relevance to industry, and accessibility.

Since its September relaunch, ICATS has witnessed a surge in interest and positive feedback, solidifying its position as a leading global platform for aroma trades education. Brown stressed ICATS' accessibility, noting the diverse geographic distribution of its students, spanning continents from Europe, the Americas, Asia and Africa.

A key moment of the session was the recognition of Raymond Chan from CPL Aromas as the ICATS medal winner. Chan, a quality control technician, was lauded for his outstanding dissertation on sustainable innovations and strategies within the fragrance industry and their socio-economic impacts. Brown quoted external examiner David Harwood, who praised Chan's work as an "MBA-style dissertation" that effectively covered the complexities of transitioning towards a more sustainable and commercially viable industry.

Brown also detailed ICATS' active engagement within the industry, highlighting its attendance at key events such as IFEAT 2023 in Berlin, and – all in 2024 – SIMPPAR in Grasse, the World Perfumery Congress in Geneva, and Flavorcon in Atlantic City. These events provided ICATS with invaluable insights into global trends, regulatory changes, sustainable practices, and emerging technologies, all of which are integrated into the programme's curriculum. Brown emphasised the importance of networking and collaboration, noting the valuable connections made at these events, which contribute to the development of fresh and relevant material for the ICATS programme.

The ICATS relaunch in September 2024 introduced a new e-learning platform, offering video lectures, podcasts, and access to an extensive e-library. This flexible format allows students to pursue the full diploma programme or select individual modules based on their career goals. Brown announced the upcoming launch of Expert Master Classes – online professional development units delivered by industry professionals – and a "Lunchtime Series" featuring concise presentations on trending topics. These initiatives further demonstrate ICATS' commitment to providing accessible and cutting-edge education. Brown concluded his report by encouraging attendees to take advantage of a special delegate course sale.

Following the ICATS report, Nthabiseng Letlalo, an R&D and flavour creation technologist from Cranbrook Flavours in South Africa, shared her experience as the 2024 IFEAT Best Student Award winner from the University of Reading Flavourist course. Letlalo proudly showcased her Ndebele attire, explaining its significance as a representation of her heritage and her father's advice to "Go out there into the world and represent where you're coming from".

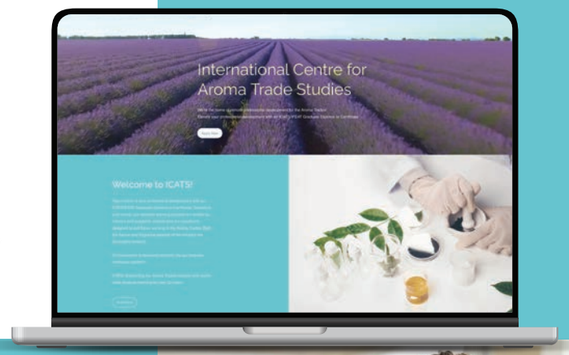
Letlalo described the three-week programme, sponsored by IFEAT in partnership with the University of Reading and the British Society of Flavourists, highlighting its focus on practical sessions, seminars, and lectures led by industry experts and university faculty members. She emphasised the course's coverage of flavour compound evaluation, formulation, reaction flavours, flavour chemistry, and legislation. The programme also included valuable experiences such as a field trip to Lionel Hitchen and a wine tasting session.

She expressed her appreciation for the hands-on learning opportunities, explaining how she applied her knowledge to create two flavours: a lime tartlet in a yogurt application and a peach apricot fizz in a carbonated soft drink. She noted the course's global reach, with participants from diverse backgrounds and countries, fostering valuable networking opportunities. Letlalo concluded her presentation by expressing her gratitude for the experience and recommending the course to anyone seeking to expand their knowledge and skills in flavour creation.

ICATS
International Centre
for Aroma Trade Studies

Elevate your expertise with ICATS mentorship or industry leadership!

Are you passionate about the Aroma Trades and eager to make an impact? Join ICATS as a mentor or industry expert and inspire the next generation of professionals in the flavour and fragrance industry.



Why Become an ICATS Mentor or Industry Expert?

- **Shape the Future:** Make a meaningful contribution to the professional growth of students worldwide through our renowned remote professional development programme.
- **Share Your Knowledge:** Collaborate with other industry and academic leaders to enhance our comprehensive curriculum.
- **Flexible Engagement:** Participate remotely using our tailored interactive platform, designed for seamless and accessible learning.

About ICATS

The International Centre for Aroma Trade Studies (ICATS), part of IFEAT Education, is a leader in remote professional development for the Aroma Trades. Accredited and endorsed by IFEAT, our courses cover every facet of the industry, spanning both the flavour and fragrance sectors. We empower students with exceptional support, a bespoke learning experience, and dynamic interactive forums.

Join us in shaping the future of the Aroma Trades!

Become a part of a global network committed to excellence in the Aroma Trades. Visit icats.education to learn more and register your interest to be an ICATS mentor or industry expert.

ICATS: **SHARING RESEARCH** I **EXCHANGING KNOWLEDGE** I **GROWING HERITAGE**

Innovation in the flavour and fragrance industry

A look at some of the talks that provided a compelling overview of the trends shaping the industry's future: the growing demand for wild-harvested ingredients, the adoption of sustainable production practices like mass balance, and the transformative potential of artificial intelligence (AI).

Deborah Vorhies

Rewilding Asia: The Emergence of Wild-Harvested Ingredients

Deborah Vorhies, CEO of FairWild Foundation, delivered an insightful presentation on the increasing importance of wild-harvested ingredients in the aromatherapy market. She emphasised the growing consumer preference for natural and sustainable products, noting that "the demand for wild ingredients has surged over the last decades, and we expect this to continue". This trend is driven by a desire for high-quality ingredients with a positive environmental impact, aligning with consumer values of responsibility and planetary stewardship.

Vorhies highlighted the diverse range of wild-harvested ingredients used in aromatherapy, including iconic botanicals like frankincense, myrrh, and sandalwood. She stressed the importance of sustainable harvesting practices to protect these valuable resources and the communities that depend on them. "When we harvest sustainably, we're protecting that species," Vorhies noted, underscoring the need for responsible sourcing that ensures both ecological and social wellbeing.

The FairWild certification programme, she explained, plays a crucial role in promoting sustainable harvesting practices. By providing a framework for transparency and traceability, it ensures that wild-harvested ingredients are sourced ethically and contribute to the long-term health of ecosystems and communities.

Thibau Caulier

Mass Balance: A Sustainable Solution for the F&F Industry

Thibau Caulier, from Syensqo, Belgium, introduced the concept of "mass balance" as a sustainable and cost-effective solution for incorporating renewable materials into fragrance production. "Mass balance is a model that allows you to reach your goals while minimising the cost," Caulier explained. This innovative approach involves blending bio-based and traditional materials while meticulously tracking their proportions through bookkeeping. This enables companies to gradually increase their use of renewable resources without substantial capital investment, making sustainability more accessible and scalable.

Caulier provided a detailed explanation of the mass balance methodology, highlighting its benefits in terms of carbon footprint reduction, quality assurance, and traceability. He emphasised the importance of third-party certification, such as ISCC PLUS, to ensure transparency and build consumer trust in mass balance systems. By adopting this approach, the F&F industry can contribute to a more circular economy while meeting the growing demand for sustainable products.

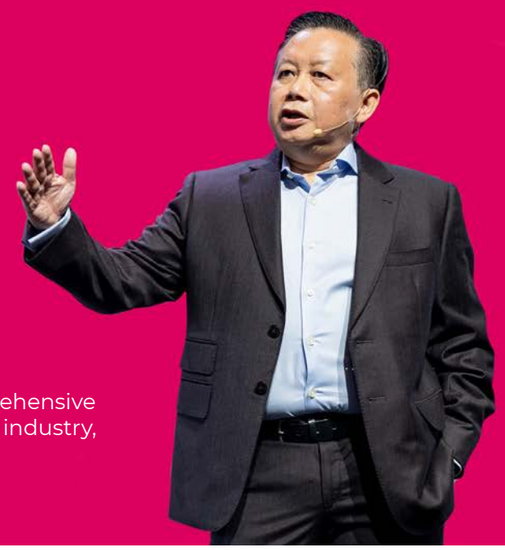
Mia Kynadi

AI: The New Frontier in Flavours and Fragrances

Mia Kynadi, co-founder of Venture Factory.ai, gave a compelling presentation on the transformative potential of artificial intelligence (AI) in the F&F industry. "AI is the new electricity," Kynadi proclaimed, pointing to its capacity to revolutionise various aspects of the value chain, from research and development to marketing and customer relations. AI, she said, can and will accelerate the discovery of new materials, optimise agricultural practices, enhance decision-making processes, and personalise consumer experiences.

Kynadi provided specific examples of AI applications in the F&F industry, including the use of AI-powered tools to predict novel fragrance molecules and optimise resource allocation in agriculture. She also discussed the potential of AI to enhance customer engagement through personalised recommendations and 24/7 support. Kynadi emphasised the importance of data readiness for successful AI implementation, stating that "getting your data in order is the first step." Her talk made clear that by embracing AI the F&F industry can unlock new levels of efficiency, innovation, and customer satisfaction.

The Medal Lecture: Indonesian Essential Oil



Robby Gunawan's Medal Lecture provided a comprehensive and passionate overview of Indonesia's essential oil industry, highlighting its rich heritage and future trajectory.

Robby Gunawan, the 2024 IFEAT Medal Lecturer, began by describing Indonesia's unique natural characteristics, stating, "Indonesia is the world's largest archipelago with 17,000 islands – we boast a vibrant ecosystem that is home to some of the richest biodiversity. From tropical rainforests to volcanic soils, Indonesia is a haven for lots of plant species, many of which are an integral part of the essential oil industry." This foundation of biodiversity, he explained, is the bedrock of the nation's essential oil production.

Gunawan's lecture focused on the delicate balance between tradition and innovation. He articulated the industry's core mission: "To ensure stakeholder wellbeing, biodiversity conservation and ethical trade practices." He envisioned Indonesia as a leader in value-added, natural-based products, emphasising that "our approach is not just about growth, but about development and harmony with nature".

He then delved into the industry's complex value chain, highlighting the crucial role of farmers and distillers. "The farmers are the first actors of the value chain. And currently there are about 200,000 farmers in Indonesia that provide raw materials for Indonesian essential oil production," he noted, making clear the industry's significant socio-economic impact. He further stated, "If you look at the whole supply chain [...] this is an industry that gives a unique multiplier effect to a large number of people. And this is something that IFEAT, as well as the whole essential oil industry, should be proud of."

The establishment of DAI (the Indonesian Essential Oil Council) was a pivotal moment. "The idea of the DAI is to unite all the stakeholders across the value chain, from farmers to distillers to researchers, government organisations, as well as the users of the essential oil," Gunawan explained, underscoring its role in fostering collaboration and growth.

Patchouli oil, a cornerstone of Indonesia's essential oil exports, was a key focus. Gunawan acknowledged the recent challenges, saying, "I'm sure this year has been the toughest year to secure this product due to the drop in production in the last two years, related to climate conditions, as well as competing commodities, and many other factors." However, he also highlighted the growing prominence of citronella oil.

Sustainability was the lecture's overarching theme. "We understand that the essential oil comes from nature and we must be responsible toward the environment," Gunawan said. He outlined key initiatives, including life cycle assessments and upcycling clove leaf byproducts. "This upcycling process transforms what might otherwise be considered as a waste material into a high-value-added product, ensuring that every part of the clove leaf is utilised."

Regarding the need for industry-wide action, he said, "We need a stronger collaboration between users and buyers of this product as well as suppliers of this product. We need to leverage the demand for sustainable products. I believe very much that it is a big effort, but if we work together, we can do that."

Robby Gunawan receives the IFEAT Medal from President Ramon Bordas.

He also discussed the circular economy approach to citronella production and the importance of responsible patchouli sourcing. He expressed a desire for a unified approach to sustainable patchouli production. "We want to have a multi-stakeholder, relatively open programme where we can share the best practice in agriculture and in distillation, so that a larger percentage of the supply chain is impacted by this programme," he said.

Gunawan concluded by stressing the importance of agroforestry and the industry's commitment to sustainability. "By working together from the farmer, distiller, all the manufacturers, researchers, and international partners, we can ensure that Indonesia will remain a global key player in the essential oil industry, providing sustainable products that benefit both the people and the planet."

Science and regulation

The Scientific Update session provided unique insight into the regulatory issues facing the F&F industry and the many complex challenges involved in ensuring that the regulation of essential oils is properly informed by science to serve people, planet and industry.

Though each presentation focused on a different aspect of the complex and multifaceted topic of regulation in our global industry, they all made clear the need for robust scientific evidence to ensure regulatory decisions are made properly.

Communication is key – between national authorities, scientific agencies and industry, from the lab to the farm to the boardroom, and all the way to the parliament floor – it is essential that the industry engages early with policy stakeholders to ensure regulatory outcomes are properly informed.

Jonathan Bonello, IFEAT Chief Scientific Officer, welcomed attendees to the session. He highlighted the diverse topics to be covered, including updates on agricultural residues, biological activity of essential oils, olfactory receptors, human toxicology, standards development, and the classification of tea tree oil. The session would also delve into regulatory matters, focusing on IFEAT's advocacy efforts and the IFEAT-EFEO Scientific Platform.

IFEAT Scientific Officer Sibel Erkilic Horsman then focused on the IFEAT Agricultural Residues Project, investigating plant protection products (PPPs), the regulatory approval processes they are subject to, and the importance of global harmonisation of pesticide regulation.

With an increasing global population and decreasing arable land, pesticides are indispensable in modern agriculture. Horsman highlighted the importance of pesticides for food production and the need to balance their use with environmental and human health concerns.

She presented a study that analysed the presence of PPP chemicals in various essential oils, which found that a significant number of these were not approved in the EU. She emphasised the need for global harmonisation of PPP regulations, open communication between authorities, and proactive measures to address the impact of PPP bans on the industry.

Australian native oils

Ashley Dowell, Secretary of the Essential Oil Producers Association of Australia (EOPAA), discussed the development of standards for Australian native oils. Australia has the potential to produce a vast range of essential oil products derived from its native plants, but lacks formal standardisation and clear characterisation of the chemotypic variations which can exist in natural populations.

EOPAA has undertaken a project to develop industry standards for emerging Australian native oils, which include clear definitions of the essential oils including chemotype, physical and chemical parameter specifications and chromatographic techniques. These standards are intended for use by producers, traders and consumers of Australian native oils.

Jens-Achim Protzen, Member of the IFEAT Executive Committee, and Dee-Ann Prather Seccombe, representing the Australian Tea Tree Industry Association (ATTIA Ltd), discussed harmonised classification and labelling in the EU, including the classification of tea tree oil as a reprotoxin and the potential impact on its use in cosmetics and aromatherapy.

She outlined ATTIA's efforts to defend tea tree oil against the EU classification, including the submission of mechanistic studies and regulatory support. She highlighted the importance of global cooperation and the need for industry support to defend essential oils against regulatory attacks.

Regulations and tribulations

Eve Davies-Tsagkadakis from FGS Global discussed IFEAT's advocacy efforts and regulatory changes in the EU, providing a helpful overview of the CLP regulation and the derogation for natural essential oils and plant extracts, secured thanks to IFEAT's advocacy efforts with FGS in 2024.

She explained the need for continued advocacy efforts – chiefly, the robust scientific evidence required to support the derogation. She also noted that the challenges posed by the classification of tea tree oil presented potential spillover effects on other substances.

Davies-Tsagkadakis highlighted the importance of the political context and the new European Commission's focus on economic competitiveness. She emphasised the potential impact of future regulations such as the revision of REACH and the cosmetics products regulation, and the need for industry collaboration and early engagement with policy stakeholders to influence regulatory outcomes.

At the centre of it all is a fundamental shift in how the EU intends to treat and assess chemicals, moving from a risk-based to a hazard-based approach, she explained. Eve used a helpful analogy, noting that, in a risk-based world, a lion in a cage would be deemed safe as a managed risk, despite its inherent hazard to humans. In this new world where hazard trumps risk, the overriding concern becomes: "What if the lion escapes?"

Eric Angelini, VP Global Regulatory Affairs & Product Safety at Mane, provided an update on the joint IFEAT-EFEO Scientific Platform, which is working to gather and analyse scientific data on essential oils. He explained the complexity of the regulatory landscape and the need for a coordinated and proactive approach.

The Platform aims to provide evidence to the EU Commission and support the derogation for essential oils. The importance of data availability and the role of IFEO and IFEAT in supporting the Platform's efforts is essential to demonstrate their distinct toxicological and environmental behaviours.

He stressed the importance of demonstrating the scientific validity of the industry's concerns, citing evidence from REACH activities that showed differing results when testing individual components versus the complete essential oil.

Angelini discussed the need for a mechanistic approach to demonstrate the synergistic effects of essential oils, and highlighted the importance of collaboration with universities and other experts to support the Platform's goals.

Antiviral and biocidal uses

Daniel Strub Ph.D, from Wrocław University of Science and Technology in Poland, focused on the scientific validation of essential oils' efficacy, particularly in antiviral and biocidal contexts. He detailed research conducted in collaboration with IFEAT Members and international partners, exploring the antiviral activity of essential oils against covid-19.

Strub presented data from a study involving over 500 samples, identifying promising candidates like benzoin resinoids and petitgrain mandarin. "We had two goals," Strub explained, "to assess whether essential oils are able to disrupt the activity of two very important proteins that are produced during the covid infection, and to test the antiviral activity of the best performing materials."

While acknowledging the low probability of these oils becoming drug-like molecules, he highlighted their potential as ingredients in mouthwashes. He also noted the impact the research paper had on the scientific community, "It was heavily discussed on social media, and our study is still the first, and only such comprehensive on this subject," he said.

Strub also discussed the potential of essential oils as natural surface disinfectants. He noted the current lack of naturally derived substances (except ethanol) registered in this category. He presented data demonstrating the efficacy of various essential oils against a range of microorganisms, showcasing their potential as alternatives to synthetic biocides.

He also showed a model disinfectant created from a mixture of essential oils and natural surfactants, proving that essential oils can be used in functional products. He stressed the need for further standardisation and research to identify active constituents. "This publication, when it will be published, is only the beginning. The next step is to work with the IFEAT Members, and interested stakeholders, because standardisation is required," he concluded.

Green Techniques and Materials for Essential Oil Analysis

Chromaleont S.r.l. at the Messina Institute of Technology (MeIT), Italy, report on their work to develop alternative and sustainable methods for analysis of volatile and non-volatile essential oil components with reduced waste and costs.

FIGURE 1. Chromaleont's laboratory at the Messina Institute of Technology (MeIT), University of Messina, Italy.

Introduction

Increasing interest and awareness in ensuring greenness and sustainability have been determining the trends in analytical chemistry in recent years. Thus, the implementation of appropriate and environmentally friendly methods for routine analysis is becoming increasingly mandatory in all sectors, accordingly.

The concept of green analytical chemistry (GAC), described for the first time in 1998 by Anastas & Warner[1], focuses on reducing or eliminating the negative impact of analytical methods to protect the environment and ensure operator safety. Recently, 12 fundamental ethics of GAC were proposed by Galuszka et al.[2] as essential guidelines for creating greener analytical methods. The key goals to be achieved in greening analytical methods are: (i) elimination or reduction of the use of chemical substances (solvents, reagents, preservatives, additives for pH adjustment and others); (ii) minimisation of energy consumption; (iii) proper management of analytical waste; and (iv) increased safety for the operator.

An important issue related to the implementation of GAC principles is the need to properly offset and reconcile the greenness of the method with its possible effectiveness. To this end, the greenness criteria should also be complemented by analytical efficiency expressed in terms of validation criteria such as accuracy, precision, sensitivity, etc., as well as practical and economic considerations, e.g. cost of analysis, sample throughput, and overall simplicity of method.

All these considerations have a huge impact on all the areas of scientific research in which analytical chemistry is involved, including the global essential oil and aroma field. The typical and unique composition of essential oils contemplates very complex mixtures that require consistent, reliable, and accurate analyses to verify safety and genuineness and to reveal authenticity fraud.

The research group of Chromaleont S.r.l. has engaged in essential oil analysis over many years and is now targeting its efforts to improve the sustainability of analytical methods based on gas chromatography (GC) and supercritical fluid chromatography (SFC).

FIGURE 2. Analysis of citrus essential oils volatile and non-volatile fractions.

Analysis of the volatile fraction

Emphasis has been recently placed on the development of GC methods using flame ionisation detection (FID) or mass spectrometry (MS) using more sustainable alternatives to helium carrier gases for the analysis of volatile substances. These include monoterpene and sesquiterpene hydrocarbons, oxygenated derivatives, and aliphatic oxygenated compounds, which make up the volatile fraction in citrus essential oils (EOs).

Recent global challenges, helium shortage or its slow supply have led to increasing costs per analysis and pushed the research towards alternative solutions such as hydrogen (H_2) and nitrogen (N_2) gases for GC-MS and GC-FID analyses, respectively. Both carrier gases meet the eco-sustainability principles, given that they can be produced in-lab using dedicated generators (ready-to-use) while minimising environmental, social, and economic impact.

Due to its high diffusivity, H_2 is known to have the highest optimal linear velocity; thus, it is the carrier gas of choice for many applications as it allows for faster analyses with no reduction in resolution[3]. Moreover, under optimum gas velocity conditions, both He and H_2 gases provide similar separation efficiencies measured in terms of height equivalent to one theoretical plate (HETP). As a result, H_2-based GC analysis can be performed in a shorter time, while generating the same sort of chromatographic separation.

Figure 3 shows the separation of volatile constituents of lemon (*Citrus Limon L.*) EO, attained using a 5% phenyl equivalent column (SLB-5ms, L × I.D. 30 m × 0.25 mm, df 0.25 µm, Merck KGaA, Darmstadt, Germany). Consistent GC-MS profile was obtained using H_2 as the carrier gas, although a significant increase in the gas linear velocity (60 cm s^{-1} for H_2 vs. 30 cm s^{-1} for He) was applied under the same temperature program (50 °C to 200 °C at 3 °C min^{-1}). A total of 50 compounds, including monoterpene, sesquiterpene, and oxygenated derivatives were eluted in about 37 min, which is faster than the analysis times typically required when using He as carrier gas (> 45 min)[4].

The method developed was fast, efficient, and highly reproducible, and accuracy was determined by analysis of certified standard mixture of terpene components (Merck KGaA, Darmstadt, Germany).

Identification was carried out using a dedicated mass spectral database (FFNSC version 4.0 GC/MS library, Shimadzu), combining mass spectra similarity (≥ 85%) and linear retention index (LRI) values (±10 units tolerance window). Given the high repeatability of retention times obtained on apolar columns, an excellent agreement was observed within experimental and library LRI values, with Δ≤5 for most components. Noticeably, absolute correspondence between experimental and reference mass spectra was also obtained, meaning that carrier gas switching to H_2 does not necessitate adjusting or modifying the database.

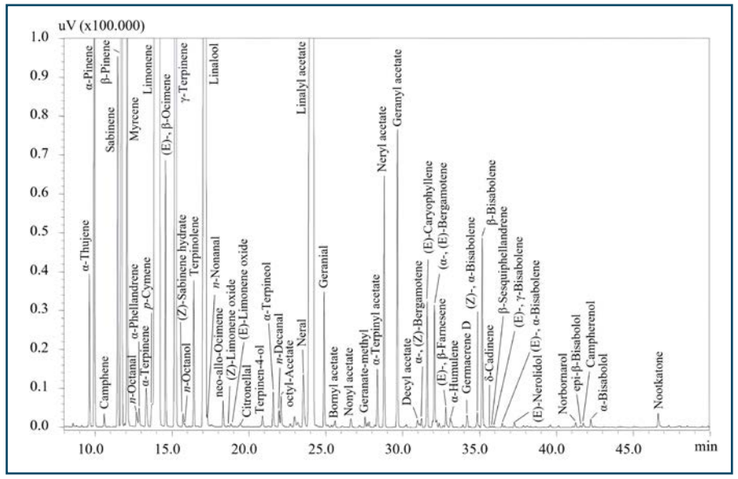


FIGURE 4. GC-FID chromatogram of bergamot essential oil (cold-pressed peels) obtained using N_2 as carrier gas (injection: 0.5 µL, split 1:10).

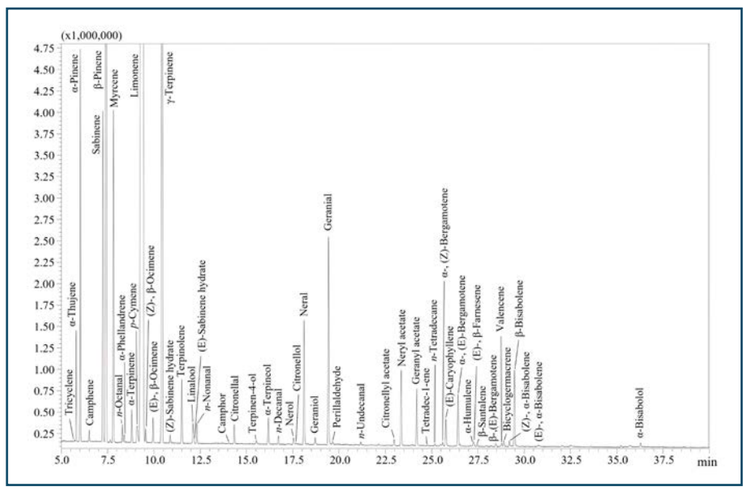


FIGURE 3. GC-MS chromatogram of lemon essential oil (cold-pressed peels) obtained using H_2 as carrier gas (injection volume: 0.5 µL, split 1:10).

Most GC-FID applications employ helium as a carrier gas due to its inertness, thermal stability, and predictable behaviour. Nitrogen is often overlooked as an alternative to helium as it is seen as a slow gas. With a low optimal linear velocity of around 10 cm s^{-1}, analysis times will be increased if the analyst wants to maintain optimal performance[5]. In addition, N_2 has a much steeper Golay curve than He and H_2 gases, thus the separation efficiency decreases significantly as the flow rate increases. Nevertheless, there are key elements that indicate N_2 as a suitable and effective carrier gas for conventional and simple-routine GC-FID analyses, such as being readily available, cost-effective, chemically inert, and safe.

Figure 4 illustrates the GC-FID chromatogram of bergamot (*Citrus bergamia*) EO obtained using N_2 as carrier gas at a constant linear velocity of 20 cm s^{-1}. Although a higher-than-

optimum linear velocity was employed, a satisfactory chromatographic performance was attained. A total of 55 components were separated in about 47 min, which is comparable to the analysis times typically required when using He as carrier gas (> 45 min)[6].

Identification was carried out using a dedicated mass spectral database (FFNSC 4 GC/MS library), combining mass spectra (similarity ≥ 85%) and linear retention index (LRI) values (±10 units tolerance window) calculated using a C_7-C_{30} alkane standard mixture. Noticeably, absolute correspondence between experimental and reference data was obtained, meaning that carrier gas switching to H_2 does not necessitate adjusting or modifying the database.

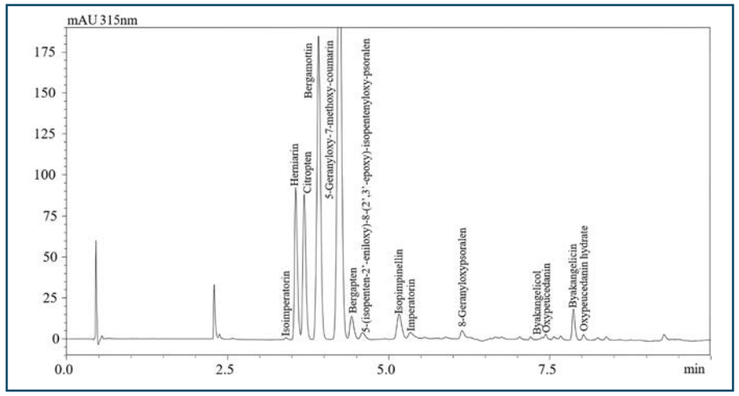


FIGURE 5. SFC-PDA chromatogram (detection at 315 nm) of lime essential oil (cold-pressed peels) obtained using bioethanol as mobile phase co-solvent (injection: 1 µL).

Experimental

Instrumentation: GCMS-QP2020 NX equipped with a split-splitless injector and an AOC-20i autosampler. GCMS solution software ver. 4.41; Nexis GC-2030 high-performance capillary gas chromatograph equipped with a split-splitless injector, an AOC-20i autosampler and an FID detector. LabSolution software ver. 5.93 with Automatic Adjustment Retention Time (AART) algorithm (Shimadzu, Duisburg, Germany).

Column: SLB-5ms, L × I.D. 30 m × 0.25 mm, df 0.25 µm (Merck KGaA, Darmstadt, Germany).

Standard material: C7-C30 Saturated Alkanes (1000 µg mL^{-1} each component); Terpene Mix A certified reference material (2000 µg/mL each component in methanol); Terpene Mix B certified reference material (2000 µg/mL each component in methanol) (Merck KGaA, Darmstadt, Germany).

Column temperature: 50 °C to 200 °C at 3 °C min^{-1}.

Analysis of the non-volatile fraction

Cold-pressed citrus EOs (namely lemon, bergamot, lime, grapefruit, mandarin, sweet and bitter orange) obtained from the peel of citrus fruits are widespread ingredients in food, cosmetic, and pharmaceutical industries. The study of the non-volatile fraction of cold-pressed citrus EOs is a valid tool to exploit their quality and authenticity, and it also represents an important means of product control.

Oxygen heterocyclic compounds (OHCs), i.e. coumarins (Cs), furocoumarins (FCs), and polymethoxyflavones (PMFs) account for 10–20% of the non-volatile fraction of citrus essences and exert several biological effects on human health[7]. Furocoumarins exhibit strong photoactivity in combination with UVA radiation and have long been investigated for their phototoxicity. For these reasons, the maximum amount of FCs in cosmetics and other products is subject to official regulation, though the Opinions in this regard are still numerous and contrasting[8-10]. Moreover, rising demand from industry, along with difficult harvest and processing, have created an avenue for fraudsters to put on the market counterfeit as well as substandard EO products, boosting the importance of accurate assessment of their authenticity.

Traditionally, reversed-phase liquid chromatography (RP-HPLC) has been the gold-standard technique for OHC analysis, delivering optimal results in terms of accuracy, repeatability, limit of detection, and quantification[7]. On the other hand, supercritical fluid chromatography (SFC) is re-emerging as a greener alternative technique, since the reduced organic solvent consumption and waste have favourable fallout in terms of toxicity, costs, and environmental impact[11]. In addition, the low mobile phase viscosity and the higher diffusion coefficients allow for faster or more efficient separations to be attained, with shorter re-equilibration times[12].

Figure 5 shows the separation of OHC constituents of lime EO (*Citrus aurantifolia*) attained on a 15 cm × 2.1 mm column based on fused-core particle technology, which allowed to obtain high speed and high efficiencies at moderate backpressures (Ascentis® Express HILIC, Merck KGaA, Darmstadt, Germany). The mobile phase consisted of CO_2 (solvent A) and bioethanol (solvent B), at 1.0 mL min^{-1}.

For method optimisation, a standard mixture containing 16 furocoumarin components was employed (Merck KGaA, Darmstadt, Germany). A total of 37 compounds were separated in less than 10 min, under a linear gradient going to 10% B in 6 min and detected by photodiode-array (PDA).

Afterwards, the method's greenness was assessed by the Analytical GREEnness calculator, a comprehensive, flexible, and straightforward assessment approach that provides an easily interpretable and informative result (open-source and downloadable from **https://mostwiedzy.pl/AGREE**). The assessment criteria are taken from the 12 principles of green analytical chemistry (SIGNIFICANCE) and are transformed into a unified 0–1 scale.

The resulting pictogram in Figure 6 gave a final score of 0.8, calculated based on the SIGNIFICANCE principles and the performance of the analytical procedure in each criterion. Significant advantages of the SFC-PDA method over RP-HPLC-PDA[13] consisted in the volume of analytical waste generated per analysis (point 7, viz. 10 mL vs 20 mL), the use of reagents obtained from renewable sources (point 10, viz. bioethanol from corn), the use of toxic reagents (point 11, viz. ethanol vs methanol and tetrahydrofuran).

FIGURE 6. AGREE graphics obtained for RP-HPLC-PDA (left) and SFC-PDA (right) methods for the analysis of oxygen heterocyclic compounds in citrus EOs.

Experimental

Instrumentation: Nexera-UC system with PDA detector (Shimadzu, Duisburg, Germany).

Ascentis® Express HILIC (2.7 µm, 90 Å) HPLC Column, 2.7 µm particle size, L × I.D. 15 cm × 2.1 mm (Merck KGaA, Darmstadt, Germany).

Standard material: Furocoumarin Mix (16 components in acetonitrile, certified reference material) (Merck KGaA, Darmstadt, Germany).

Solvents: Ethanol (gradient grade for liquid chromatography) (Merck KGaA, Darmstadt, Germany).

Gradient: 0 min, 2% B; 1 min, 3% B; 4 min, 3% B; 6 min, 10% B at 1.0 mL min-1.

Conclusions

One of the most important challenges to the future of chemical analysis is to reach a compromise between the increasing quality of the results and the improving environmental friendliness.

For the analysis of citrus essential oils, the use of H_2 and N_2 as carrier gases for terpene and terpenoid profiling was demonstrated to be a valid alternative for GC-MS and GC-FID analyses. A neat gain in terms of costs per analysis was obtained, confirming that both gases represent a valid, sustainable, and environmentally friendly alternative to helium. As the price of helium is set to continue to rise for the foreseeable future, the results here show that nitrogen and hydrogen can be used as convenient alternative carrier gases without loss of performance.

On the other hand, switching the separation technique for the non-volatile EO fraction from RP-HPLC to SFC afforded comparable performance while meeting the demands for greener analytical methods, as demonstrated by quantitative greenness evaluation metrics.

MORE INFO AT:
https://www.chromaleont.it/essential-oils-analysis

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Citrus: a complex global market

The citrus industry is facing a confluence of challenges, from climate volatility and disease to regulatory hurdles and shifting consumer demand.

On the final day in Bangkok, a round-the-world tour of citrus-producing regions followed by a lively panel discussion and Q&A provided the platform for industry leaders to discuss challenges and explore potential solutions, highlighting the need for collaboration, innovation, and a long-term perspective to ensure the continued success of this vital sector.

The Mediterranean

Felice Chirico, co-owner and CEO of Agrumaria Reggina, presented a nuanced picture of the Mediterranean citrus industry, highlighting the region's unique strengths and vulnerabilities. He emphasised the diversity of citrus production in the region, with Spain and Italy leading the way in orange cultivation, while Türkiye dominates the region's lemon market. However, the industry faces challenges from climate volatility, with drought and extreme weather events impacting yields and fruit quality.

Felice Chirico

"In Spain", Chirico began, "heavy rains and drought led to a reduction in fruit size", – meanwhile in Morocco, heavy drought has impacted mandarin production. These challenges underscore the need for sustainable water management practices and resilient agricultural systems to adapt to the changing climate.

Chirico also highlighted the fragmented nature of the Mediterranean citrus processing sector, particularly in orange production. "The high number of processing companies is decreasing the competitiveness of the industry", he argued, calling for consolidation and strategic alliances to strengthen the sector's position in the global market.

He stressed the need for a "risk diversification approach" and greater collaboration between producers and processors to ensure the long-term viability of the Mediterranean citrus industry.

Mexico

Sigifredo Gudiño, Managing Director of Citrojugo, provided a detailed overview of the Mexican citrus industry, highlighting its global significance as the world's leading exporter of limes.

Sigifredo Gudiño

The industry faces significant challenges from *Huánglóngbing* (HLB) – also known as citrus greening disease – and climate change.

"HLB remains a concern", Gudiño acknowledged, while also highlighting the industry's success in managing the disease in limes through the development of natural treatments and proactive management strategies. Climate change, particularly drought, poses another major threat to Mexican citrus production. "Mexico experienced its driest year in the last decade", Gudiño noted. He highlighted the importance of investing in sustainable water management practices, such as high-tech irrigation systems, to mitigate the impact of drought and ensure the long-term resilience of the industry.

Brazil

Monica Bonafin, Commercial Manager at the Louis Dreyfus Company, presented a comprehensive analysis of the Brazilian orange industry. Brazil is the world's largest producer of orange juice and essential oils.

Monica Bonafin

The industry is facing a severe crisis due to the combined impact of HLB disease and climate change. "Brazil is going through a tough, tough moment", Bonafin acknowledged, while also celebrating the industry's resilience and commitment to innovation.

HLB has caused a significant decline in orange production, leading to soaring prices and concerns about future supply. "There's no question about a reduction in supply", Bonafin stated, highlighting the 20% decrease in essential oil production in the past season. The industry is responding to this challenge through a combination of strategies, including expanding citrus cultivation to new regions with lower HLB incidence and investing in irrigation infrastructure to mitigate the impact of drought.

Bonafin also discussed the impact of these challenges on the quality of essential oils, particularly the decline in aldehyde levels. "We've seen a trend down", she reported, attributing this decline to climate change and the need to harvest fruit earlier due to HLB.

Despite these challenges, Bonafin expressed optimism about the future of the Brazilian citrus industry, citing the significant investments being made in new plantings and sustainable practices.

Japan

Kenji Yagi from Takasago International Corporation provided insights into the Japanese citrus market, describing the unique challenges and opportunities facing the region.

He discussed the impact of rising import costs on orange consumption, noting that "orange oil import volume tends to decrease as the unit price increases". This trend underscores the need for the Japanese citrus industry to adapt to a changing global market and explore new strategies to ensure its competitiveness.

Kenji Yagi

Yagi also highlighted the importance of domestic citrus varieties, such as *unshu mikan (Citrus unshiu)* – also known as Japanese mandarin – and Yuzu *(Citrus × junos)*, in meeting consumer demand and diversifying the industry's offerings. He stressed the need for collaboration across the value chain to address challenges and capitalise on opportunities.

The Roundtable

The conference culminated in a dynamic roundtable discussion moderated by Sergio Dávalos – Marketing Director at Cota Ltda, Argentina, and Member of the IFEAT Executive Committee. The discussion brought together the speakers to delve deeper into the challenges and opportunities facing the citrus industry, fostering a lively exchange of ideas and perspectives.

Sergio Dávalos moderated the panel discussion.

HLB remained a central concern, with Chirico highlighting the threat it poses to the Mediterranean region despite the absence of confirmed cases. Gudiño shared Mexico's experience in managing HLB in limes, emphasising the importance of proactive measures and industry collaboration. Bonafin discussed Brazil's efforts to control the disease, including new planting strategies and research into natural solutions.

Climate change was another key topic, with speakers discussing the need for sustainable practices and investments in irrigation infrastructure to mitigate the impact of drought and extreme weather events. The discussion also highlighted the social and economic consequences of industry consolidation, particularly for small-scale growers.

Looking ahead, the panellists expressed optimism about the future of the citrus industry, citing the continued strong demand for citrus products and the industry's commitment to innovation and sustainability. The roundtable concluded with a call for greater collaboration across the value chain to address the challenges and capitalise on the opportunities presented by the evolving global citrus market.

A Call to Action

The session provided a valuable platform for stakeholders in the citrus industry to discuss the complex challenges and potential solutions facing this vital sector. The presentations and discussions highlighted the need for a multifaceted approach, encompassing sustainable water management practices, innovative disease control strategies, and greater collaboration across the value chain.

It also underscored the importance of consumer education and engagement in promoting the value of citrus products and supporting sustainable practices. The panellists agreed – by working together, the citrus industry can navigate these challenging times and ensure a resilient and thriving future for this essential sector.

Spotlight on Sustainability

Bangkok served as a vibrant platform for discussions on sustainability, highlighting the multifaceted nature of this critical issue for the industry. The Conference showcased a diverse range of perspectives, from navigating the complex regulatory landscape to exploring innovative approaches to sustainable sourcing and production.

The centrepiece of the sustainability session was a roundtable discussion that brought together a diverse panel of experts to delve deeper into the complexities of carbon footprint and human rights.

Regulatory frameworks and industry initiatives

Tuesday's sustainability session commenced with Rajesh Nair, a partner at EY, providing a comprehensive overview of the evolving regulatory landscape. He noted the growing emphasis on sustainability across industries, driven by concerns around climate change, economic resilience, and brand reputation. "Wall Street directs what Main Street does", Nair remarked, highlighting the influence of green funds and ESG ratings in shaping corporate behaviour. He stressed the need for companies to go beyond mere compliance and embed sustainability into their core processes, urging them to "dissect your processes, multi-layer wise", to understand their full environmental and social impact.

Following Nair, Sven Ballschmiede, representing IOFI, continued the discussion by focusing on the role of various actors – governments, the private sector, and civil society – in the sustainability transition. He highlighted the proactive stance of the F&F sector, particularly in response to the EU's Green Deal and its associated regulations, such as the CS3D directive, the CSRD reporting directive, and the EU Deforestation Regulation. Ballschmiede spoke of the need for value chain coordination, raising awareness, and cooperation among stakeholders to effectively navigate these regulatory changes. He also discussed IOFI's proactive initiatives, including the development of a scope 3 emissions factor repository to aid the industry in carbon reporting.

Esteemed industry consultant Alain Frix – President of Allchemix Consultancy and a Member of the IFEAT Panel of Experts, followed with a comprehensive presentation on the complexities of sustainability in the flavours and fragrances industry. He underscored the need to "transform magic into science" by meticulously measuring and analysing the impact of the industry's diverse ingredients and processes.

Frix highlighted the interplay between fossil and renewable sources, noting that, "Overall, by volume, the F&F industry is about 800,000 tonnes, and two-thirds is from fossil origin". He emphasised the importance of harmonisation and transparency, urging stakeholders to "ensure value chain coordination – upstream, downstream, and F&F in the middle".

With the stage set, the roundtable discussion brought together a diverse panel of experts to delve deeper into these complexities. The discussion, moderated by Frix, featured representatives from across the value chain, from producers of natural and synthetic ingredients to certification bodies. This interactive session provided a unique opportunity for participants to share their perspectives, debate key challenges, and explore potential solutions.

The importance of collaboration and standardisation in addressing carbon footprint emerged as a key theme. Cordula Mock-Knoblauch from BASF shared insights on the "Together for Sustainability" initiative and the development of a standardised methodology for calculating a product's carbon footprint. She stressed the importance of third-party verification and transparency, stating that "We really have to […] have a common understanding on how this data is verified".

Martina Bianchini, President of IFRA, presented the IFRA Green Chemistry Compass as a tool to help companies assess and improve their sustainability performance. She acknowledged the challenges of navigating the complex landscape of sustainability initiatives, admitting that "there's never one-size-fits-all".

Human rights

The panel's discussion of human rights underscored the need for a more profound engagement with the social and economic dimensions of sustainability. Christian Van Osselaer from Envirium Life Sciences shared his experiences working in conflict zones, highlighting the role of responsible businesses in providing livelihoods and protecting vulnerable communities. He stressed the need for investment and collaboration to mitigate human rights risks, stating that "we really need to act".

Filip Lissicharov, a producer of natural ingredients, echoed this sentiment, urging the industry to "design a model" for human rights together. He emphasised the importance of a participatory approach, stating, "I don't want a model for human rights brought to me by anyone. I want to sit together on the table with everybody and design this model".

Sustainability by design

In a separate session, Mitch Cooke from Port Blakely, New Zealand Essential Oils, presented a compelling case study, sharing his company's journey in establishing a new Douglas fir (Pseudotsuga menziesii) essential oil production facility with sustainability at its core. "Our company mission is to cultivate a healthy world", he explained, noting that this mission guides every aspect of their operations. He outlined their approach to balancing a "triple bottom line" of people, planet, and profit, highlighting their innovative plantation design, energy-efficient distillery practices, and commitment to the Forest Stewardship Council (FSC) certification.

Cooke noted the importance of plantation forests in supporting sustainability goals, observing that they "provide jobs for rural communities", are "so important for the environment", and offer "immense economic value". He detailed their unique hedge design approach, which involves harvesting channels from existing Douglas fir plantations and utilising the regenerating hedges for essential oil production. This method allows them to "effectively upcycle a poor performing crop", create a "sustainable and self-replenishing feedstock", and act as a carbon sink.

Cooke highlighted their efforts to minimise their environmental footprint by utilising biomass from the distillation process to power their distillery, significantly reducing their reliance on fossil fuels. He also shared their plans for future sustainability initiatives, including registering their land as a permanent carbon sink under the New Zealand Emissions Trading Scheme, exploring alternative crops with local farmers, and implementing a steam turbine generator to achieve 100% renewable energy on-site.

Cooke emphasised the importance of third-party verification in validating sustainability claims, highlighting the value of the FSC certification in building consumer trust and recognition. He noted that "FSC is the world's most trusted sustainable forestry certification," and that "nearly half [of consumers surveyed] recognised the FSC trademark when they saw it".

He concluded by urging the industry to take proactive steps towards sustainability, stating that "It's our responsibility to define what sustainability looks like in your business, and commit to taking some action today".

A Call for Collective Action

The sustainability sessions served as a powerful reminder of the industry's shared responsibility in creating a more sustainable future. The diverse perspectives shared throughout the Conference highlighted the need for ongoing dialogue, collaboration, and innovation to address the complex challenges and capitalise on the emerging opportunities.

As the industry moves forward, there is no doubt that sustainability must be embedded into the very fabric of operations, from sourcing and production to consumer engagement and regulatory compliance. The Bangkok Conference provided a valuable platform for fostering this collective commitment, inspiring stakeholders across the value chain to embrace a more sustainable path forward.

Alain Frix


Cordula Mock-Knoblauch


Martina Bianchini


Mitch Cooke


Rajesh Nair


Sven Ballschmiede

MY FAVOURITE

Mitch Cooke
Port Blakely NZ Essential Oils

My Favourite: New Zealand Douglas Fir

By **Mitch Cooke**, Business Manager – Port Blakely NZ Essential Oils

Introduction

Forests are more than just resources – they're ecosystems that shape the world around us and offer so much in return. For me, they've been places of learning and reflection, shaping both my career and my connection to nature. Among them, Douglas fir (*Pseudotsuga menziesii*) stands out – a tree with a unique story, cultural significance, and an essential oil that truly sets it apart.

From Forestry to Fragrance

My journey with Douglas fir essential oil began long before I ever dreamed I would be involved in its production. During my university days studying Forestry Science, I would spend my summers gaining work experience on the port, measuring logs destined for export markets. Most of the time, it was radiata pine – a staple of New Zealand forestry – but every so often, a load of Douglas fir logs would roll through. Those days were my favourite. You could smell the trucks arriving long before they came into view, carrying that unmistakable fresh, sweet, citrusy aroma. It was a stark contrast to my least favourite species, poplar – an entirely different olfactory experience, to put it kindly!

That scent has become something more to me – a nostalgic reminder of long summer days spent pruning Douglas fir trees and cold winters planting them. A friend and I used to joke after hours in the bush, covered head to toe in sticky Douglas fir sap, that we were wearing an exclusive cologne we called "Doug-fresh".

Back then, I never imagined that aroma would follow me into my professional life. The idea of one day extracting that beautiful essence and sharing it with the world never crossed my mind. And yet, here I am – deeply connected to this incredible essential oil that has been a part of my story from the very beginning.

Historical and Cultural Significance

What fascinates me about Douglas fir is that it's not actually a true fir species (*Abies sp.*); it was misnamed, and belongs to its own genus, *Pseudotsuga*, meaning "false hemlock". This genetic difference sets it apart from other conifers and contributes to the distinctive qualities of its essential oil – often catching people pleasantly by surprise when they experience it for the first time.

For Indigenous peoples of the Pacific Northwest, Douglas fir extracts were valued for their practical versatility. They used its resin for all sorts of practical purposes – sealing canoes, waterproofing tools, and even as a natural adhesive. It also had medicinal uses, like treating wounds, infections, and soothing sore throats. Ancient wisdom knew the value of this tree, far beyond just its timber.

Thriving in New Zealand

Douglas fir has found a second home in New Zealand, thriving far beyond expectations. Native to the Pacific Northwest, this tree has adapted beautifully to our cool climate, rich soils, and clean air. The unspoiled landscapes of the lower South Island provide the perfect environment for the trees to grow strong and healthy, producing wood and, more recently, essential oil of outstanding quality.

The oil has a fresh, crisp scent that I think really captures the clean, vibrant feel of the New Zealand landscape. It's fascinating to see how this tree, originally from the other side of the world, has become such a standout here – growing over 25% faster than in its native environment.

Capturing the Forest Experience

Douglas fir trees emit relatively high levels of Volatile Organic Compounds (VOCs) compared to other commercial conifers, creating the calming and rejuvenating experience of walking through their forests – or, as the Japanese beautifully call it, Shinrinyoku (forest bathing). These natural emissions enrich the surrounding air, infusing it with the tree's essence.

While these high VOCs result in lower essential oil yields compared to its conifer cousins, they're also what make the oil so unique. I believe it's a rare and genuine connection to the forest. The same crisp, uplifting aroma that fills the forest air is captured in the oil, offering an authentic reflection of what you'd experience walking among the trees.

Production Process

Douglas fir essential oil is typically extracted from the tree's needles and branches, and I've learned that timing is everything. Harvesting and distilling on the same day is crucial to preserving its vibrant freshness. We use steam distillation with mountain spring water – a process that demands careful handling and precise heat control to bring out the oil's best qualities. It's always rewarding to see how this approach captures the true essence of the Douglas fir species.

To me, product excellence and sustainability need to go hand-in-hand, which is why we distil within the forest and power the process with a biomass boiler, reducing our carbon footprint and paying respect to the environment that sustains us.

Sensory and Emotional Appeal

When people think of conifer essential oils, they often imagine sharp, piney, sometimes spicey, turpentine-like aromas. However, Douglas fir essential oil offers a profile that is both refreshing and surprisingly refined. Its scent is a harmonious balance of woody sweetness, herbaceous undertones, and a bright, sparkling citrus top note.

I find that whether it's someone in the fragrance industry or a casual enthusiast, the reaction is almost always the same – pleasant surprise and admiration for its complexity. It stands apart from other conifer oils, offering a richness and versatility that make it truly unique. In my opinion, Douglas fir deserves its title as the "King of the Conifers", not only for its record-setting growth but also for its captivating aroma, which elevates any space or creation it touches.

"I see Douglas fir essential oil as a reflection of the forest – complex yet harmonious, natural yet refined."

Applications and Uses

Douglas fir is a well-balanced standalone oil, which explains why it's been used in aromatherapy for a long time. It's fantastic for clearing the mind, creating a sense of calm, and helping you feel grounded yet refreshed. It's exciting to see it getting increasing attention in fine fragrance. Perfumers appreciate its complexity, cost-in-use, and versatility; and as a less-known ingredient, it's being recognised for creating unique and distinctive fragrances.

For me, one of the best ways to enjoy it is in the shower. A couple of drops in the corner before the hot water starts, and the steam fills the space with that unmistakable aroma. It always brings a wave of nostalgia, taking me back to those early days in the forest. It's such a simple thing, but it's one of my favourite ways to reset, whether I'm gearing up for the day or winding down.

Reflections of the Forest

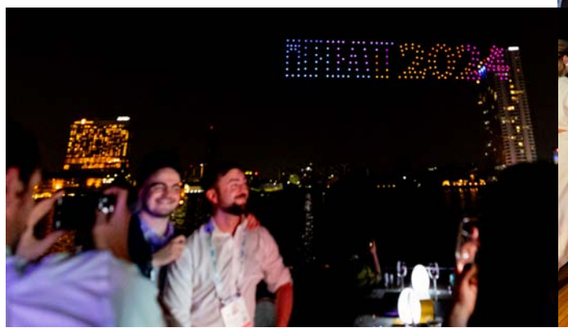
I see Douglas fir essential oil as a reflection of the forest – complex yet harmonious, natural yet refined. At the core of my work is a commitment to sustainable forestry, ensuring these vital ecosystems not only survive but thrive for generations to come. Forests are more than resources – they are life itself, offering oxygen, storing carbon, fostering communities, nurturing biodiversity, and giving us a place to reconnect with ourselves and the natural world.

Treating Douglas fir oil with care and respect is my way of honouring these landscapes and what they represent. Its vibrant aroma isn't just something to enjoy – it's a reminder of the forest's story, its resilience, and its importance. For me, this work is about more than oil. It's about inspiring others to see the value in nature, to protect what matters, and to reconnect with something greater than ourselves.

Socials and Entertainment

IFEAT Dinner

Always a special night, this year's IFEAT Dinner, sponsored by Herbochem Industries, did not disappoint. Guests were treated to an unforgettable moonlit cruise along the Chao Phraya River. There was dancing, music, great food and even better company! A spectacular drone show capped off the evening – 300 dancing lights synchronised in the Bangkok night sky for a display celebrating IFEAT, essential oils and our beautiful host city.



Young IFEATians

A first for IFEAT, the Young IFEATians evening event gave younger Members the chance to meet both with their peers and more experienced potential mentors, creating connections around the world to be nurtured throughout their long careers ahead.

The poolside event was fantastically well attended, with IFEAT Executive Committee Members Sergio Dávalos and Henry Gill presiding over a lighthearted networking team exercise, where groups came up with creative solutions to industry case studies.

There was dancing well into the warm Bangkok night, with a DJ and MC providing the party atmosphere to welcome and celebrate IFEAT's newer Members. The perfect launch for an initiative sure to become a Conference staple.

The Closing Banquet

The event reached its finale with a phenomenal Closing Banquet at the neighbouring EmSphere venue. Delegates were welcomed first by a bespoke array of Thai food stalls and performances showcasing the diverse regional cuisines and traditional folk dances, music and stories from across Thailand.

This fitting celebration of our host country's unique culture and hospitality was topped off with a series of breathtaking performances from Thai dance and musical troupes in the beautifully appointed main hall.

Delegates were then treated to yet more wonderful pan-Asian food, before filling the dancefloor in celebration of an unforgettable Conference, then bidding fond farewells to colleagues and friends, new and old, until next time.

Petrus Arifin receives the IFEAT Founder's Award

Petrus Arifin, Owner of PT Karimun Kencana Aromatics, Indonesia, was awarded the IFEAT Founder's Award for 2024 in Bangkok. The award, presented by IFEAT President Ramon Bordas, recognises Arifin's exceptional service and contributions to the flavours and fragrance industry.

Born in Medan in 1942, Arifin's career began within his family's business, established in 1965 as the first official exporter of patchouli oil from Indonesia. He officially took the helm of the company, renamed PT Karimun Kencana Aromatics, in 1984, transforming it into a leading supplier of Indonesian essential oils, renowned for its quality and reliability.

Ramon Bordas noted his "passion, hands-on approach, and industry insight", particularly his crucial role in rebuilding the patchouli supply network after the devastating 2004 tsunami and earthquake. He is also the president of the Indonesian Essential Oil Trade Association (INDESSOTA) and a recipient of numerous Primaniyarta Awards – the highest honour for Indonesian exporters.

Beyond his industry contributions, Arifin is a respected figure in Chinese calligraphy, with his work published and exhibited widely. He also serves as the chairman of the Chinese Calligraphy Society in Medan. The IFEAT Founders Award celebrates Arifin's decades of dedication to the essential oil industry and his profound impact on the Indonesian market.

Welcome to IFEAT

Jisha Das joined IFEAT as Socio-Economic & Committees Administration Coordinator in March 2025.

What is your role with IFEAT?

In my role with IFEAT, I coordinate the organisation's vital socio-economic initiatives and provide administrative support to our key committees. I work very closely with the Socio-Economic Committee Chair to manage projects, liaise with our global partners, and ensure our operations run seamlessly. I'm particularly keen to develop and expand impactful projects for the Socio-Economic Committee, with a strong focus on sustainability and advancing our industry. Ultimately, I support IFEAT's core mission and engage with our Members worldwide.

What is your background?

My background is in global marketing strategy, and I have 14 years of experience driving growth strategies for both food ingredients and technology companies. I have proven expertise in areas like product management, international marketing, data-driven campaign optimisation, and technical marketing.

I'm adept at fostering cross-functional collaboration, delivering measurable results, enhancing brand visibility and customer engagement. I've worked at Mane Kancor and an automobile software company called Acsia Technologies, in previous roles. My educational background includes a Master of Business Management in Marketing from the Asian School of Business and a Bachelor of Technology in Biotechnology & Chemical Engineering from Kerala University.

Which Committees do you work most closely with and what are your key projects?

I work most closely with the Socio-Economic Committee, where I'm focused on developing and expanding impactful projects. I also assist Louise Kapor, IFEAT's Company Secretary, with any work that she needs done.

What are you excited about achieving with IFEAT?

I'm incredibly excited about the opportunity to make a real difference in sustainability and contribute to helping our planet through IFEAT's initiatives. I'm also thrilled to be a part of the organisation's growth and development. While IFEAT's conferences are certainly a highlight – and the coming together of our community is always exciting – I believe IFEAT is about so much more. It's about the power we hold, as a collective, to truly change the fate of our industry and the world.

Ewelina Goralczyk-Obel joined IFEAT in January 2025 as Finance Assistant. Over the years, she has focused on finance and accounting, gaining experience by working with various companies and supporting their finance departments. At IFEAT, she will be working closely with the Finance Manager. She is very excited to contribute to such a great organisation and to gain further experience in her field.

POST-CONFERENCE TOUR REPORT

Indian Sandalwood, Santalum album In Thailand

Report by Stephen Pisano and Rithika Gupta

On Friday November 15th, following the IFEAT Bangkok Conference, 32 delegates from 11 countries gathered in the lobby of the Marriott Marquis Queens Park to embark on a journey that would take us to Shri Shyam (Holdings) Co., Ltd. – a sandalwood plantation located three hours outside Bangkok. The day trip was organised by IFEAT in conjunction with Rithika Gupta from FP Aromatics Singapore, a multi-generational family business specialising in sandalwood oil.

Shri Shyam (Holdings) Co., Ltd. was established in 2014 under the guidance of Dr Anantha Padmanabha, fulfilling the dream of the founder Mr Rajiv Gupta. In 2015 they planted 300,000 sandalwood trees and 300,000 host trees on 1,500 acres of virgin land which they levelled, cultivated and installed drip irrigation on the sandy loam land under every tree. The farm is now home to over 2 million sandalwood trees (*Santalum album*) of various ages, and an equal number of host trees that the sandalwood need to survive.

Today the farm thrives under the passionate care of the owner, Mr. Nilesh Italiya. As far as we know, it is the only commercial sandalwood farm of this size in all of Asia. There are approximately 78 species of sandalwood in the world; however, *Santalum album* – known as "The Queen of Mysore", a region in India historically associated with sandalwood – is the farm's species of choice.

The plantation's active nursery guarantees the sustainability of the trees into the future. To date, the plantation has not produced any oil because the trees are still too young to cut down. This represents an enormous long-term commitment on the part of the investors and patience for all participants involved with the project.

Sandalwood trees reach maturity in 15-20 years, at which time the oil steam distilled from the heartwood is at its peak, yielding 3-5% sandalwood oil. After 15 years the oil yield increase is not significant enough to extend the life of the tree; however, it is said that "the older the tree, the creamier the top notes of the oil". It's all about the odour, which is subjective and is based on the opinion of the individual perfumer or user.

Sandalwood saplings grow 3-5 cm per year. When the tree is three years old, the lower lateral branches up to one metre in length are pruned. Heartwood initiation begins in the fifth year for a well-tended tree. The average girth of the tree will be 25–28 cm in year eight. A mature 15-year-old sandalwood tree contains approximately 40kg of heartwood, which equates to approximately 1kg of oil.

The farm is also home to about 400 cows who provide through their dung, urine and buttermilk the ingredients used to make organic pesticide sprayed on the trees four times a year. The buttermilk mixture acts as a fungicide and an insecticide. When the trees are sprayed, the stench is such that the entire staff gets two days off.

Jivamrut, a natural and organic fertiliser is also applied every two months – except during the rainy season – to promote growth. Jivamrut is a bio-fertiliser rich in micro-organisms, consisting of a mixture of cow manure and urine with beans.

By dividing the farm into zones, the trees are cared for simultaneously and systematically. Reservoirs were dug on property to ensure a continual supply of water. Massive pumps are used to support the extensive drip irrigation system.

Sandalwood trees start flowering at the age of three. The flowers produce berries that contain seeds. The berries are de-juiced and the exposed seeds are collected and dried naturally for two months before they are dipped in gibberellic acid, which helps release the seeds from dormition. The seeds are then planted into pits; there are two types of pits measuring 2x2x2 feet, the terrain/climate determines which one is used.

Sunken bed pits are used in dry conditions and raised beds are used when water/rain is available. The pits are filled with 15kg of manure and left for one week prior to planting seeds in each pit. It takes 35-40 days before the seedlings appear.

Sandalwood is a root hemiparasite, meaning that the roots do not have the ability to absorb nutrition directly from the soil; as a result, the sandalwood tree is dependent and sustained by its 'host' plant/tree. When a seedling reaches the "four-leaf" stage, the baby tree is transferred into a poly bag and potted along with its "pot host", usually from the spinach family, the first of three hosts that will nourish the tree during its lifetime.

After six months the sandalwood sapling, now approximately one and half feet tall, is transplanted with the intermediate host into the field. At the same time, the long-term host is also planted adjacent. Allowing enough space for growth, the same process is repeated further down the row.

Through trial-and-error, Shri Shyam has found that *Sesbania grandiflora* plants work best as intermediate hosts and *Casuarina* trees are preferred as final host trees. The intermediate host lives about four-to-five years, leaving the sandalwood and final host tree to live side-by-side until they are both eventually cut down. Additionally, the root ball is a very important source of oil and is dug out and distilled. Were the root ball to remain in the ground, seedlings would eventually appear where the old tree once stood. The host tree has no value; its biomass is used to feed the boilers. It is interesting to note that sandalwood trees have a shallow root system that grows horizontally – in the wild, the roots can extend up to 200 feet in search of a host tree to sustain them.

Sandalwood oil is produced from the heartwood in the centre of the trunk, which is de-barked and de-sapped, readying the heartwood for distillation along with the main branches and the root ball. Shri Shyam has a pilot steam distillation unit on location to test the progress of the trees. The pilot still holds up to 500kg of chipped heartwood and the distillation time is three days. An uninterrupted process requiring the boiler to be continually fed the biomass is used to maintain the pressure and steam flow.

It takes eight hours of distillation before the first droplets of precious oil appear. Larger distillation units will be added in the future as needed. Distillation time is based on the capacity of the units – the larger the volume of chipped heartwood, the longer the distillation time. The current plan is to process approximately 10,000 trees (10 tonnes of oil) within the first year of maturity. The leaves do not contain oil and have no commercial value.

Finally, the farm provides employment to the local community fostering economic growth and promoting sustainable farming practices. The farm provides a better quality of life and a brighter future for the workers, their families, and their communities.

IFEAT and the participants would like to take this opportunity to thank FP Aromatics and Shri Shyam (Holdings) Co., Ltd. for the opportunity and for hosting what was a fascinating and most enjoyable day. We wish them the very best and hope the farm will send us updates – we look forward to receiving them.

Richard C Pisano 1934-2024

All at IFEAT were sad to learn of the passing of Richard C Pisano, one of the founding members of IFEAT. He passed away in October 2024, two weeks away from his ninetieth birthday .

In 1956, upon his graduation from The Wharton School, The University of Pennsylvania he joined Citrus and Allied Essential Oils, a company with fewer than ten employees, located in Brooklyn NY.

Richard had a vision to transform this small company into a supplier of a broad range of high-quality essential oils and processed specialties for the flavour and fragrance industries. He expanded the traditional citrus oils-based product line to include a wide range of spice oils, domestic mint oils and other distilled specialties. In the 1960s, Citrus and Allied Essences Ltd began to offer aroma chemicals.

Richard served on several Flavour and Fragrance industry boards, beginning in the 1960s with the Essential Oils Association (EOA) and its successor the Fragrance Materials Association (FMA). He was on the board of The Research Institute for Fragrance Materials, Inc. (RIFM) and was a founding member of IFEAT. For many years he was on IFEAT's Executive Committee and served as both Chairman and President.

Richard became a member of the Flavor and Extract Manufacturers Association (FEMA) Board in 1978 and was elected President in 1989. He also served for years as FEMA's representative to IOFI.

In 2006, he was awarded the Richard Hall Distinguished Service Award. As a longtime friend of Richard and Barbara Hall, the Hall award was especially meaningful to him.

He was a recipient of the FMA Eric Bruell Award, and the US Fragrance Industry's Special Lifetime Achievement Award.

Richard was an ethical and principled man, a man of integrity, and honour. And a proud American who, as a young man, served his country in military intelligence. He sang in the church choir, was a Knight of the Holy Sepulcher Grand Cross and an enthusiastic and accomplished singer and sailor.

Richard grew up in the flavour and fragrance and ingredient industries at a time when the ethos of individual companies reflected the strong and often unique personalities of their owners. In that spirit, he always spoke up at meetings.

He was one of the last of the "old-timers" – although we are certain he would have preferred to be described as one of the last of the "long-timers".

Richard Pisano's passing elicited an outpouring of heartfelt condolences and tributes from across the essential oils and flavour and fragrance industry. The overwhelming sentiment was one of deep sadness and respect for a man widely regarded as a giant in the field. Beyond his professional accomplishments, Pisano was praised for his warmth, kindness, and generosity. He was described as a "true gentleman" and a "caring spirit" who fostered genuine connections with those around him.

He will be deeply missed by all who had the privilege of knowing him.

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Factores y Mercadeo S.A.
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Contacts: **Aldemar Castaño Rodriguez / Anggi Cruz**
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Web: **factoresymercadeo.com**

Factores y Mercadeo S.A. is a recognised company in the market with 35 years of experience in the industry, specialised in the importation and commercialisation of raw materials for different sectors of the industry.

Florachem Aromatics Pvt., Ltd.
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Contact: **Vivek D**
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We aim to provide a complete sourcing solution for all your aroma chemicals requirements with a customer-centric focus and prompt services.

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VIPSEN - a leading Vietnamese essential oil manufacturer, offering a diverse range of high-quality, locally sourced products to serve global fragrance and flavour markets

NEW IFEAT MEMBERS

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Web: **herbinnmorocco.com**

Herbinn is a wholsaler based in Marrakech specialised in the production and the exportation of plants, vegetable and essential oils of 100% natural origin, and authorised by the Ministry of the Interior, Water & Forests to exploit Moroccan forests and mountainous areas for the harvesting wild plants such as rosemary, thyme, and pennyroyal amongst others.

Huangshan Tianxiang Technology Co., Ltd.
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Contact: **Rukshani Perera**
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Web: **kpscinnamon.com**

KPS is one of the most recognised brand names among the leading manufacturers of cinnamon essential oils in Sri Lanka, with over 30 years of experience in the cinnamon trade.

M.R. Herbal and Naturals
Raigarh Road, Lailunga, Distt-Raigarh
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Email: **info@mrherbal.in**
Email: **abhash@mrherbal.in**
Web: **mrherbal.in**

M.R. Herbal and Naturals is one of the leading essential oil manufacturers in India. We produce and supply pure, natural and organic essential oils to our clients.

May Lindstrom Skin
2652 Pasadena Ave, Los Angeles, California
USA

Contact: **Felicia Baudar**
Email: **kitchen@maylindstrom.com**
Web: **maylindstrom.com**

May Lindstrom Skin, an organic cosmetic company, was born from an intention to restore one's connection to skin while igniting recognition of everyone's unique beauty. We are committed to crafting our products ethically and with uncompromising integrity, from the seed to the bottle. Our collection is handcrafted using only the finest exotic and nutrient-rich ingredients that are: organic, bio-dynamic, wild-crafted, cruelty free, sustainable, and/or harvested with social consciousness in mind.

Natara Global Ltd
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Hartlepool TS25 2DT
UK

Contact: **Stacy Schwarz**
Email: **Stacy.Schwarz@natara-global.com**
Web: **natara-global.com**

We are Natara, a leading independent, global manufacturer of speciality aroma chemicals, natural aroma chemicals, extracts and oils for the flavour and fragrance industry.

Northern Solvents Private Limited
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Email: **info@northernsolvents.com**
Web: **northernextracts.in**

Northern Extracts is a manufacturer of high-quality oleoresins, essential oils & herbal extracts, committed to providing exceptional products to the seasonings, flavours, fragrances, and nutraceutical industry. Our specialty and expertise lie in the processing of Nofth Indian herbs and spices.

Oshinatural (Shenzhen) International Trading Co., Ltd.
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Contact: **Solo Zhu**
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We are a trading company from China looking for high-quality essential oils, hydrosol and other aromatic products from all over the world and import to sell in China.

Phoenix Natural Products Ltd
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Phoenix Natural Products is a leading supplier of essential oils, carrier oils, cosmetic ingredients and manufacturer of natural products in the UK.

S.A. Veracruz
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Argentina

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Web: **saveracruz.com.ar**

S.A. Veracruz a family business in Tucumán, Argentina, that produces and exports lemons and derivatives, combining 30 years of citrus expertise with innovation.

Sakkara Essential Oils
Sakkara Road, Mariotia Canal, Giza
Egypt

Contact: **Maha Omar**
Email: **maha@sakkaraessentialoil.com**
Web: **sakkaraessentialoil.com**

Sakkara Essential Oils Company produces and exports essential oils, concretes and absolutes for 20 years. We work under Egyptian Organisation for Industry and International trade laws where our products are characterised by high quality, competitive price and shipping goods to customers on time and good follow-up.

Scimplify
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Scimplify is an specialty chemicals company operating across the product life cycle from contract research, lab scale development to commercial manufacturing of specialty chemicals.

Shandong Jitian Aroma Chemical Co., Ltd.
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Shandong Jitian Aroma is a research, production and sales of high-tech enterprise from China. (Stock code 871258)

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Lamornal's company founder has over ten years' experience in the F&F industry, and is willing to bring the best materials and service to clients.

Sharp Mint Limited
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Snowco specialises in supplying natural aromatic ingredients for the flavour and fragrance industry and serves as a custom manufacturer of specialty chemical products tailored for research and pharmaceutical applications.

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