Crop Protection Chemistry

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The **14th IUPAC International Congress of Crop Protection Chemistry** was held 19-24 May 2019 in Ghent, Belgium (www.iupac2019.be). This Congress Series has been ongoing approximately every four years since 1967 and is managed by the IUPAC Chemistry and the Environment Division (Div VI) Advisory Committee on Crop Protection Chemistry. The 14th Congress was organized by the University of Ghent (UGent), under the leadership of Pieter Spanoghe and Nathan De Geyter, and held at the International Convention Centre in Ghent. This Centre lies in a tranquil oasis in the middle of Ghent's largest park.

The Congress presented a unique opportunity to enable knowledge exchange and research cooperation on all scientific aspects of crop protection between the most important actors in industry, academia, and government, both related to research and practical application. Around 1572 top international experts from more than 80 countries turned up in Ghent to share their research and perspectives on sustainable crop protection. They enjoyed five days of high quality, diverse and innovative scientific programming, including lectures, posters, and debates. To link theory to practice, a total of eleven "sustainable agricultural excursions" were organized to demonstration farms and crop protection chemistry research sites of companies, universities, and farm advisory services.

To enrich the Congress and promote cross-fertilization between different sectors, the programs of two related conferences were also embedded within the IUPAC Congress. These included a 2-day "Crop Protection Regulatory Workshop" organized by the European Crop Protection Association (link with regulation) and a 1-day "UGent International Symposium on Crop Protection" (link with innovations in alternative crop protection). In addition, a meeting of the Division VI Advisory Committee on Crop Protection Chemistry was held during the Congress.

IUPAC Award

A highlight of the Congress opening ceremony was the presentation of the biennial "IUPAC International Award for Harmonized Approaches to Crop Protection Chemistry." This year, the award was presented to honor the late Dr. Mark R. Lynch, who had a storied career of more than 45 years as a regulator, national and international work group leader, and consultant. Dr. Lynch's base appointment was with the Irish Department of Agriculture, and from there he played an instrumental role in the development of harmonized EU legislation and supporting guidance related to pesticide approval via Directive 91/414 EEC. He also led the OECD in implementation of a "Vision for Pesticides", which yielded the foundational guidance documents and tools for international collaboration and work-sharing. Dr. Lynch's award was received by his daughter and granddaughter, and an honorary lecture was presented by Dr. Gordon Rennick of the Irish Department of Agriculture, himself a noteworthy international expert on regulation of crop protection products.

Scientific Program

The theme of the IUPAC Congress was "*Crop Protection: Education of the Future Generation*" and the expansive program was organized around 10 main scientific topics:

1. Emerging issues and challenges
2. Novel agricultural technologies
3. Discovery and optimization of crop protection products
4. Formulation and application technologies
5. Non-dietary human health hazards, exposure and risk
6. Food quality and safety
7. Environmental fate, transport, and metabolism
8. Ecosystem and ecological risk assessment
9. Mode of action and resistance
10. Stewardship, regulation, and communication

The scientific program reflected well the traditional strengths of the IUPAC crop protection chemistry

NextGen Agri-preneurs: Enthusiastic participation of young scientists in the IUPAC 2019 NextGen summit

Longtime IUPAC member Keiji Tanaka discussing a poster presentation.

congresses, including plenary lectures, invited lecture sessions, and poster sessions. There were nine plenary lecturers representing all major sectors and ranging in diversity from a Nobel laureate chemist to a potato farmer.

- *Research excellence through innovation: Doing one's own thing*; Fraser Stoddart, Northwestern University, USA
- *Cyclic lipopeptides: versatile molecules for plant disease control*; Monica Höfte, Ghent University, Belgium
- *History, status and potential of natural products for pest management and plant health?* Pam Marrone, Marrone Bio Innovations Inc., USA
- *Emerging food safety risk—new challenges for Latin American countries*; Nuri Gras, Chilean Food Safety and Quality Agency, Chile
- *Precision agriculture in practice*; Jacob van den Borne, van den Borne Potatoes, The Netherlands
- *PERFECT UPportunities for REALsearch in AgriCOOLture*. Hlami Ngwenya, University of Free State, South Africa
- *The EU's plant protection policy: Lessons learned and next steps*; Vytenis Andriukaitis, EU Commissioner on Food & Health, European Commission, Lithuania
- *Research and development of green pesticides in China*; Xuhong Qian, East China Normal University, China
- *Block chain trust*; David Zaruk, Odisee University College, Belgium

The heart of the scientific program consisted of some 300 invited lectures along with more than 700 posters, the latter including innovative e-poster boards. To recognize excellence in poster presentations, 21 poster prizes were also awarded by an international scientific jury. In addition to innovation and new product development, many researchers reported on studies of the potential effects of crop protection products on human health and the environment.

An innovative and highly popular aspect of the scientific program was provided by the "lively plenary debates" organized at the end of the afternoon sessions. These debates were organized around "hot topics" of contemporary interest for crop protection chemistry:

- Crop protection science-based facts and fact-based policy.
- Farming and crop protection in 10, 20, and 30 years.
- Communication on agroscience to the broad public.
- Engaging the next generation for agriculture.

Each debate topic featured a panel of experts drawn from various sectors, and debates were moderated by award-winning international journalist and broadcaster Femi Oke (BBC, CNN, Sky TV). Her highly energetic style and use of provocative questions led to lively discussion and diverse perspectives among panelists and good engagement from the audience, who were also able to intervene with questions.

Young Scientists

In keeping with the Congress theme of "Education of the Future Generation," significant attention and resources went toward the engagement of young scientists. This included designation of quotas for the participation of young researchers in the various invited lecture sessions.

The organizers felt it was essential to involve the next generation of crop protection leaders and to show them how important their role is for the future of agriculture. Thus, a special international youth competition and summit were organized as part of the Congress and branded as the "IUPAC Next Generation Program" or "NextGen" (https://nextgen.iupac2019.be/). The competition invited students and recently graduated crop protection chemists and agro-ecologists to share their innovative ideas on crop protection. More than 500 proposals were submitted from all over the world, of which 187 were posted to the IUPAC NextGen website for viewing (>200 000 views) and initial voting by website visitors (>83 000 visitors). Based on an expert panel review, 50 laureates were selected to participate in the "Next Generation Agri Summit", which

ran as part of the IUPAC Congress program. Finally, five young entrepreneurs in agriculture were selected as "N-GAGE Champions." These champions were able to present their innovative ideas at the Congress and each will receive guidance for a year and 5000 € in funding to effectively realize their innovative concept.

- *Modern crop protection using tools farmers have at hand*; Simon Appeltans, Belgium
- *The management of plant diseases using botanicals and ICT in Nigeria*; Apolowo Oluropo Ayotunde, Nigeria
- *Pestisorb remediation of pesticide rinsate using activated carbon derived from agricultural wastes*; Eric Jhon Cruz, Philippines
- *Adapting nanotechnology as versatile instrument for the development of eco-friendly pest control methods with semiochemicals*; Bruna Czarnobai De Jorge, Brazil
- *Drone technology to tackle pests in Botswana*; Antonette Ncube, Botswana

Communications and Social Media

To enrich the experience of attendees and reach many other stakeholders, Congress organizers made masterful use of the latest in communication and social media technologies leading up to and during the Congress. This included development of a highly interactive Congress website, elaboration of the Congress program via a smartphone app, e-newsletters, a blog, posts to Twitter and Instagram, and live-streaming of key sessions.

In the run-up to the Congress, biweekly e-newsletters were sent to a database that grew to nearly 7000 international crop protection experts. The content of the newsletters contained both practical information and stories about innovations in crop protection research that partners wished to share with the crop protection community. These stories were also first posted via a blog associated with the Congress website.

Furthermore, there was extensive communication during the conference on social media, such as Twitter (@IUPAC2019 and @IUPACNEXTGEN) and Instagram (@IUPAC2019) with a joint reach of 1339 followers. Top tweets achieved more than 9000 views.

Opening ceremony, plenary lectures, and lively plenary debates were all live-streamed on-line, and video recordings of these events are now posted to YouTube (www.iupac2019.be/videos/).

In a fitting move, the closing ceremony included a smashing "Congress After-Movie" of key images and voices from the Congress (https://youtu.be/IqNkiM1k088).

What's Next?

Full papers and extended abstracts from the 14th IUPAC Congress will be published in the University of Ghent's *Communications in Agricultural and Applied Biological Sciences*. Selected papers have also been invited for publication in a special issue of the journal "*Pest Management Science.*"

The 15th International Congress of Crop Protection Chemistry will be organized in New Delhi, India, during 10-13 January 2023. Congress organization will be led by longtime IUPAC members Dr. N.A. Shakil and Dr. Jitendra Kuma, and early details are available via the Congress website at **www.iupac2023.com.**