

Conference Call

New Chemistries for Phytomedicines and Crop Protection Chemicals

by J.B. Unsworth, N.A. Shakil, and J. Kumar

The 3rd International IUPAC Conference on “**Agro-chemicals Protecting Crop, Health and Natural Environment—New Chemistries for Phytomedicines and Crop Protection Chemicals**” was held at the National Agricultural Science Centre, New Delhi, India from 6-9 April 2016. The conference acted as a forum for scientists of different disciplines, from academia, government, and industry, to discuss the latest trends and discoveries in agrochemicals and phytomedicines and to suggest how these may impact future policies at State and National levels. The opening ceremony was opened by the Chief Guest, Dr. N. K. Krishna Kumar, Deputy Director General (Horticultural Science), Indian Council of Agricultural Research (ICAR), who delivered his inaugural lecture and emphasised the need to develop Public Private Partnership (PPP), along with other priority areas. The conference attracted over 350 participants, coming mainly from India but also from both developed and developing countries such as Belgium, Canada, China, Japan, Sudan, Switzerland, the UK, and the USA, and including around 200 young scientists. The scientific programme was supplemented by an exhibition of scientific equipment and laboratory supplies.

Each day, the conference began with a plenary session. Over four days, eleven plenary lectures were given covering various topics, including the research and development of agrochemicals, integrated pest management, nutraceuticals, and medicinal plants.



Dr N. K. Krishna Kumar, Deputy Director General (Horticultural Science), Indian Council of Agricultural Research (ICAR), giving the inaugural lecture.

The lectures were delivered by scientists coming not only from India, but also from Canada, Japan, Switzerland, and the UK. The plenary sessions were followed by concurrent sessions at which a total of 40 invited lectures were given, covering topics such as pesticide residues, crop pests and diseases, exploring biodiversity for biopesticides and phytomedicines, genetically modified crops, pesticide resistance management, integrated pest management, and nanotechnology. In addition, two workshops were held as an integral part of the conference. These were a two-day Ecological Risk Assessment Workshop and a one-day Workshop on a Review for the All India Coordinated Research Programme on Medicinal and Aromatic Plants and Betelvine. Young scientists were well represented in the poster sessions, at which a total of about 100 posters were presented. Each poster was judged on its scientific merit, content, and presentation. Prizes were awarded to the three posters judged to be the most outstanding, a difficult choice between many excellent presentations. Nine recommendations from the lectures and discussions held during the conference were put forward to help guide future policy in India. These can be summarised as follows:

Chemical Pesticides

With a rapidly increasing global population, food security is of paramount importance. This is particularly true for India, which accounts for 17% of the world population. Chemical pesticides remain extremely important in ensuring a sustainable supply of food, even if their use raises the concerns of policy makers due to possible adverse environmental and health effects. Research into the discovery of new molecules and novel formulations which make for safer products is ongoing, including research into biopesticides derived from plants. Pesticide residues remaining on treated crops can be a concern, and monitoring programmes for residues, including on crops for export, should continue to ensure that residue levels are within legal limits.

Biopesticides

Interesting research is being carried out to find new pesticides derived from natural plant or microbial products. However, there are several potential limitations, such as their complex structures and, in some cases, their short life in the environment. It must be shown that the use of these biopesticides under normal agricultural conditions will protect the crop adequately from the pest which is to be controlled.

Integrated pest management

Integrated pest management (IPM) should be stressed and training of farmers by qualified experts should be carried out to ensure that this technique is used appropriately and effectively in controlling target pests.

Training

Training of farmers in the safe use of chemical pesticides should continue and be increased. This should include training courses on how to decipher a label, how to mix and load safely, what protective clothing must be worn, and how to apply a product according to the label recommendations to avoid contamination of themselves and water courses. Training on integrated pest management should also be included. Farmers and suppliers must be aware of the occurrence of sub-standard and counterfeit pesticides. Pesticide suppliers should also undergo appropriate training to ensure that they understand the potential issues with the pesticides they stock. There is also a need for a public/private partnership (PPP) for R&D programmes in India.

Regulations

Registration of pesticides should be sufficient to protect human health and the environment. However, the regulations must not be too complex or costly to meet. Where there is good scientific evidence that data from one country can be used to support registration in India this should be allowed. Similarly, studies carried out according to harmonised OECD protocols should not be repeated using local protocols. Proper risk assessments should be carried out for registration purposes, rather than just using the inherent properties of the

molecule.

Public awareness

The media still like to give the impression that chemical pesticides are inherently unsafe; industry, academia and government, together with the help of international organisations, should increase the awareness of the public that chemical pesticides can be used safely in ways that pose no problem to human health or the environment. In addition, the benefits of using these products to increase the food supply should be widely publicised in a way understandable to non-experts.

Biotechnology

New techniques are being enabled by biotechnology. These techniques should be built on in order to develop herbicide resistance and insecticidal properties, and, in addition, new traits in crops such as drought resistance and increased storage times (increased shelf life).

Phytomedicines

Due to the emerging global demand for phytomedicines, medicinal and aromatic plants that are collected from forests, etc. are overexploited, with many plants becoming rare and endangered. This situation requires conservation of natural habitats and sustainable utilization in order to maintain ecological balance. Genomics, molecular breeding, diagnostics and vaccines, nanotechnology, secondary agriculture, farm mechanization, energy, and technology dissemination are the critical areas that must be given priority. Agro-techniques could also be developed for the cultivation of phytomedicines on degraded land and in wastelands. Where possible, waste from medicinal and aromatic

Participants at the 3rd International APCHNE Conference, New Delhi, 6-9 April 2016



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crops should be considered for potential use as value-added products. Additionally, the development of alternative uses for existing phytochemicals could be investigated. Bioassay-guided discovery approaches for product development, together with smart drug delivery systems to enhance the bioavailability of active molecules, could be established using Ayurgenomics (Ayurveda/traditional knowledge). The standardization of post-harvest management practices like drying, sorting, grading, packaging, storage, and transportation are important for the development of phyto-medicines. The development of non-destructive techniques and bar coding for quality control, the framing of regulatory standards and traceability of products from source to supply (supply chain management and quality assurance, QA) are also important.

The Valedictory Function of the conference was Chaired by Dr. C. D. Mayee, Former Chairman, Agricultural Scientists Recruitment Board (ASRB), New Delhi, India, who stressed the importance of close collaboration with participating delegates for future research. He also complimented the organisers for bringing together a group of young and seasoned researchers on one platform and hoped that this will help strengthen future research.

Science: How Close to Open?

by Bruno Vilela

During the Open Science Conference organised by the Dutch Presidency of the Council of the EU, the European Association for Chemical and Molecular Sciences (EuCheMS) held the workshop **Science: How Close to Open?** in Amsterdam on 5 April 2016. This event looked into the present and future of intellectual property boundaries in chemistry research and debated questions such as:

- Which model for peer-review publishing?
- Who owns research data and how to share it?
- Which approach is better for creating innovative products and services?

David Cole-Hamilton, EuCheMS President and Chair of the event, opened the workshop by giving an insightful overview on the history and models of scientific publication, which is now reaching a new stage where openness seems to be taking the central place.

Wolfram Koch, GDCh, presented GDCh's position paper *On the future of scientific publishing*, which

came out of discussions with academics, chemical industry professionals, publishers, libraries, and funding organisations, as well as from GDCh's experience with the gold open access model (where the author or his institution pay to publish) with the publication ChemistryOpen. Koch mentioned that chemists are sceptical about gold open access, and that the green open access model (where an article becomes open after a closed period) would be a preferred option. He also pointed out that non-scientific criteria should not be included in the publication process.

Emma Wilson, Royal Society of Chemistry (RSC), started her presentation by sharing statistics showing that chemistry is a discipline with lower open access publishing, with green open access the preferred model for publishing. RSC journals always have gold open access options, and about 10% of RSC's content is published under this model. Wilson also showed that the landscape around Europe regarding the publication of open access articles varies from country to country.

José Cotta, DG Connect, European Commission, focused on the principles of open science and how to better achieve them via the digital single market, stressing the importance of the flow of data and the reform of intellectual property that can protect authors and publishers, while making science more efficient, transparent, and interdisciplinary and enabling broader societal impact and innovation. He also mentioned that beneficiaries of Horizon 2020 must ensure open access to all peer-reviewed scientific publications relating to its results. Cotta also highlighted the importance of infrastructure in open science and the upcoming European Open Science Cloud, a virtual environment bringing together existing and emerging data infrastructures for all European researchers to store, manage, analyse, and re-use data.

Cristina Todasca, University Politehnica of Bucharest, pointed out the advantages of open science for society and on the challenges that open access presents to young researchers. Open publication makes it easier to use research to influence policy, allows researchers from all around the world to easily access papers, while increasing citation rates, but many questions still have to be answered. Who should fund open access, grant holders or institutions? How to cope with the different fee levels between open access journals that might make elite journals accessible only to researchers from higher GDP Countries? Finally, given the fact that publishing in open access needs to be paid by the researcher or his institute, there must be a fair mechanism to deal with the foreseeable increase in the num-