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Nuclear Techniques in Food and Agriculture

Food & Environmental Protection Newsletter

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To Our Readers

The New Food and Environmental Protection Laboratory in the Yukiya Amano Laboratory Building Seibersdorf, Austria, Ready to Move into During Summer 2020.

The work of the Food and Environmental Protection (FEP) Subprogramme of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture started well in the beginning of the year. Planned activities of the Subprogramme focused on implementation of coordinated research projects, technical support to national and regional technical cooperation projects, organization of workshops and training courses, participation in international conferences and meetings as well as R&D activities at the Food and Environmental Protection Laboratory. Unfortunately, this plan was severely disrupted by the global spread of the COVID-19 virus. All events of the first half of the year including meetings and training courses to be implemented, have been postponed and/or re-scheduled. Most of the planned duty travels in the first half of the year were also cancelled. In order to minimize the impacts of the COVID-19 pandemic on the FEP Subprogramme, all staff of the FEP Section and Laboratory have worked from home. The main work progress, outputs and achievements in the last six months are reported in this issue of the newsletter.

Progress has been made in the implementation of the coordinated research projects (CRPs). The final evaluations

of CRPs D62009 on irradiated foods and D52037 on food traceability were completed and the CRP D62009 has been formally closed. The progress reports for Midterm Review of two ongoing CRPs D52040 on food authenticity and D52041 on mixed contaminants in food, were presented to the Committees for Coordinated Research Activities (CCRA) and both have been approved for continuation. Two new CRPs (D61025 and D52043) were formally announced in the website of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture for call of research proposals; the project D61025 will focus on "Innovating Radiation Processing of Food with Low Energy Beams from Machine Sources" and D52043 on "Depletion of Veterinary Pharmaceuticals and Radiometric Analysis of their Residues in Animal Matrices". A number of eligible proposals for the two new CRPs were received and the qualified ones will be selected to develop research contracts. The new schedule for research coordination meetings (RCMs) and some training course can be found in the section of Forthcoming Events in this newsletter.

As regards the planning and implementation of Technical Cooperation Projects (TCPs) in the field of food safety, the FEP team has continued to provide technical support to national, regional and interregional TCPs. We are currently working on 72 TCPs, including the launching of 38 new projects for the TC cycle 2020–2021 and implementation of 34 ongoing TCPs carried over from previous biennium. An updated list of these TCPs is included in this newsletter. The main activities on these TCPs include finalization and finetune of implementation plans, arrangement of procurements, re-schedule of training courses and workshops, coordination of in scientific visits and fellowships, etc. Detailed work progress, outputs and success stories are reported in specific articles in this newsletter. In addition, we have started to review new programme concept notes from Member States for the design of new TCPs in the biennium 2022–2023.

As international meetings and conferences in the last six months were either postponed or cancelled, we have kept communications with other international organizations and Member States such as our contributions to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the Codex Alimentarius Committee and its committees including CCPR and CCCF. Some reports in this regard are also included in this newsletter.

R&D activities at the FEP Laboratory were affected during the lockdown of the Lab for almost three months. FEPL staff have focused their work on research papers submitted to peer reviewed journals and various progress reports. The articles contributed by FEPL colleagues to this newsletter include recent progress and achievements of R&D activities on verification of milk quality, authenticity of Manuka honey, metabolomic analysis of orange juice, optimization of multiresidue analysis method, biomonitoring of freshwater ecosystems and multispectral imaging for food authenticity screening, etc. In addition, a new 'Link' for the Food and Environmental Protection Laboratory is specially designed and now introduced in this newsletter, which presents a new platform for sharing operational and analytical methods with Member States and the other FAO/IAEA Agriculture & Biotechnology Laboratories as well.

The feature article in this issue of the newsletter has targeted on the COVID-19 pandemic vs global food safety from a food fraud perspective, which may stimulate more discussions and suggestions on improving resilience in Member States' food control systems.

With respect to publications, I would like to highlight the recently published "*Strategies and Practices in the Remediation of Radioactive Contamination in Agriculture.*" This publication presents the proceedings of a workshop on the remediation of radioactive contamination in agriculture including both laboratory findings and practical field-work experience in planning and implementing remediation activities. This will be a good reference for international organizations, national or regional authorities and professionals involved in the remediation of radioactive contamination in food and agriculture.

Finally, I would like to inform you that I will be retiring at the end of August 2020, after having served the FAO and the IAEA in various capacities for five years. It is a lifetime experience working with so many bright and brilliant colleagues and friends from different parts of the world. I will take with me these fond memories which I will cherish for whole of my life. I am very grateful to our collaborators across the globe for their generosity, interest and understanding. My special thanks to all my colleagues at the FAO and IAEA for their kind support, encouragement and friendship over these years. I am leaving very pleased that a new and modern Food Safety and Environmental Protection Laboratory has been accomplished and launched for operation in June 2020. I will be handing over a strong food safety team that will continue to work on and contribute to the improvement of food safety and control systems in the world with novel nuclear analytical technology.

I wish you all good heath, peace, prosperity and the best in your future endeavors.

With gratitude,

Zhihua Ye

Head, Food and Environmental Protection Section

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http://www-naweb.iaea.org/nafa/fep/index.html
http://www-naweb.iaea.org/nafa/fep/fep-laboratory.html
http://www.fao.org/ag/portal/age-index.html

Feature Article

COVID-19 and Food Safety – Improving Resilience in Member States' Food Control Systems

Andrew Cannavan

The IAEA is helping Member States to improve the resilience of their food safety and food control systems through a Peaceful Uses Initiative (PUI) project 'Enhancing Capacity in Member States for Rapid Response to Food Safety Incidents and Emergencies', which is funded by the Government of Japan. The scope of the PUI project prepares Member States to respond to pandemics such as the current COVID-19 and other similar crises that may occur in the future.

Coronavirus Disease 2019 (COVID-19) is the disease caused by the novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Initially identified in December 2019, the virus rapidly spread throughout the world and by mid-May 2020 more than 4.5 million cases of COVID-19 had been reported in more than 188 countries and territories, resulting in more than 315,000 deaths. Many governments have introduced measures and controls to minimize the movement and interaction of their citizens in order to slow transmission and reduce the overall impact of the virus on public health. While governments have sought to balance public health and economic considerations, these measures have had significant impacts on the economy, including the food industry and food safety competent authorities and regulatory bodies, with a consequent impact on food safety.

It is considered highly unlikely that people can contract COVID-19 from food or food packaging. To date there is no evidence that SARS-CoV-2 is carried by domestic food producing animals such as poultry, pigs, cattle, camels, horses, sheep, goats or fish. Nevertheless, in accordance with national government and WHO guidelines, good hygienic practise should always be observed when handling and preparing food. Cooking food thoroughly will kill the virus, and fresh fruit and vegetables should be washed under running water before eating.

Although COVID-19 is not directly transmitted by food, the current pandemic is causing serious negative effects to the integrity of the food supply. As well as the critical health concerns, it has highlighted the importance of the availability of safe and healthy food through our very complex food supply chains. The global food sector is being impacted both economically and socially, across the entire food chain, in relation to factors such as human resources; disruptions to supply chains of ingredients, packaging, finished products and equipment; sourcing (alternative suppliers may be needed at short notice); and transportation of people, materials and goods. National Food Safety Control Systems, as described in the Codex Guidelines for the Validation of Food Safety Control Measures (CAC/GL 69-2008) are compromised. The capacity of competent food safety and control authorities to deploy inspection staff is seriously impaired by issues such as local lockdown instructions, staff illness and self-isolation, staff working from home and reallocation of staff for COVID-19 response duties, which has led in some instances to a relaxation in regulatory inspections. Food testing laboratories have the same issues and, in some cases, may also be diverted to perform COVID-19 clinical testing.

Disruption of transport and distribution of food commodities provides a greater opportunity for fraudulent practices with adulterated or counterfeit products. Fraudsters may take advantage of reduced inspection and testing capacities in competent authorities, and reduction in industry/private sector audits, certification and accreditation schemes. Some food commodities and ingredients are unavailable or in short supply. Consequently, food businesses may relax their focus on the integrity of the supply chain, presenting opportunities for food fraud. Shortages of certain products due to panic buying and supply chain disruption may lead to criminals offering counterfeit or adulterated foods such as meat and milk, which is in high demand and can be easily replaced with substandard alternatives. Food supplements and vitamin supplements may also be counterfeit or have harmful constituents. For example, EUROPOL has reported recent seizures in the EU of packages of counterfeit food supplements originating from various countries, including Brazil, China, Germany, Sweden and the UK. EUROPOL has also reported that mafia-style organised criminal groups, that have been known to be involved in the trade of counterfeit and substandard goods including food, are likely to take advantage of the disruption caused by the COVID-19 crisis to offer such foods more widely due to increased demand driven by consumers' perception of current or imminent food shortages. Increased on-line ordering of food products through the internet, while consumers are in lockdown, presents a higher risk of food fraud, since many countries and competent authorities have weaker legislation and control programmes for e-commerce.

Reduction of controls and inspection also presents the opportunity for misuse of agrochemicals such as pesticides and veterinary drugs, potentially giving rise to harmful residue levels of both authorised and illegal compounds in food.

The IAEA helps its Member States to build capacity for food safety control through the technical cooperation programme and coordinated research projects. Further to those mainstream activities, there has been a recent focus on enhancing resilience in Member States and improving their abilities to respond to crises such as the COVID-19

pandemic that affect the food supply chain. The current pandemic has highlighted the importance of the project 'Enhancing Capacity in Member States for Rapid Response to Food Safety Incidents and Emergencies', which is funded by the government of Japan under the 'Peaceful Uses Initiative' mechanism. This project enables applied research in the Joint FAO/IAEA Division's Food and Environmental Protection Laboratory (FEPL) at Seibersdorf to develop analytical methodology for the detection of food contaminants and adulterants and to verify the geographical origin of foods. The capacity to effectively respond to incidents and situations compromising food safety is developed in Member States through enhancement of their knowledge and understanding of the potential underlying food safety problems and the tools available to control the problems. Through the transfer of analytical methods, that provide the reliable food safety and authenticity data needed, governments, the food sector and consumers can make informed and science-based decisions to manage such situations. Effective technology and knowledge transfer is achieved through training courses, the development of databases and other online resources, and networking. The project includes important aspects such as proficiency testing to demonstrate the reliability of laboratory and field measurements.

A major focus of the project is on cost-effective screening 'point of contact' methods employing nuclear, isotopic and related technologies that can be deployed in the field (on the food production line or supply chain) to provide rapid answers regarding the safety, quality or authenticity of food raw materials or products. This type of first-tier testing reduces the reliance on high-tech laboratory testing, can often be performed by less skilled or specialised personnel, and can be applied if needed at the point of use of the product in real time.

The project commenced in mid-2019. One training course on the use of stable isotope techniques to determine food origin and verify food authenticity was held in the FEPL at Seibersdorf, 7–18 October 2019, with 22 participants from 16 countries, and several further courses are planned. The next training course, on the detection and control of organic contaminants in food, was planned for April 2020 but had to be postponed due to travel restrictions imposed by the COVID-19 pandemic and will now be held in October 2020 in the new Yukiya Amano Laboratory building at Seibersdorf, to which the FEPL will relocate during the June to July period of 2020. Twenty-four participants from developing countries have already been selected to participate in the training course.

In crisis situations such as the COVID-19 pandemic, it is essential to ensure that reliable and credible data and information are accessible to the authorities, industry and to the public. In this regard, dissemination of information and the technology, skills and knowledge transferred through the PUI project's activities will be greatly enhanced by the Agency initiated and supported food safety laboratory networks in Africa, Asia and Latin America/Caribbean.

A laboratory session during the PUI training course in FEPL, October 2019.

PUI training course participants at Seibersdorf, October 2019.

INFORMATION SOURCES

Further information on food safety and COVID-19 can be found at the sites listed below:

European Centre for Disease Prevention and Control, Q&A on COVID-19: https://www.ecdc.europa.eu/en/covid-19/questions-answers

EUROPOL, Viral marketing - Counterfeits, substandard goods and intellectual property crime in the COVID-19 pandemic: https://www.europol.europa.eu/publications-documents/viral-marketing-counterfeits-substandard-goods-and-intellectual-property-crime-in-covid-19-pandemic

FAO. 2020. Food Safety in the time of COVID-19: http://www.fao.org/documents/card/en/c/ca8623en

FAO/WHO, COVID-19 and Food Safety: Guidance for competent authorities responsible for national food safety control systems - Interim guidance 22 April 2020: https://apps.who.int/iris/bitstream/handle/10665/331842/WHO-2019-nCoV-Food_Safety_authorities-2020.1-eng.pdf

Food Authenticity Network, Resources available on the Food Authenticity Network to help mitigate food fraud during the Covid-19: http://www.foodauthenticity.uk/covid-19

Food Industry Asia (FIA), Food Safety Risks Related to SARS-CoV-2 in Asia Pacific: https://covid-19.foodindustry.asia/wp-content/uploads/2020/05/Food-Safety-Risks-Related-to-COVID-19-in-Asia-Pacific-Summary_v2.pdf

Food Industry Asia (FIA), Maintaining Food Resilience in a Time of Uncertainty https://foodindustry.asia/documentdownload.axd?documentresourceid=32471

Institute of Food Science and Technology (IFST), COVID-19 Knowledge Hub: https://www.ifst.org/resources-policy/covid-19-knowledge-hub

Ministry of Agriculture, Forestry and Fisheries, Japan, Regarding responses to the new coronavirus disease (COVID-19): https://www.maff.go.jp/e/policies/fishery/notice.html

Forthcoming Events

Research Coordination Meetings of FAO/IAEA Coodinated Research Projects and Training Courses

Final Research Coordination Meeting on Development and Strengthening of Radio-Analytical and Complementary Techniques to Control Residues of Veterinary Drugs and Related Chemicals in Aquaculture Products (D52039-CR-4), Vienna, Austria, 10–14 August 2020.

Third Research Coordination Meeting on Integrated Radiometric and Complementary Techniques for Mixed Contaminants and Residues in Foods (D52041-CR-3), Vienna, Austria, 5–9 October 2020.

Training Course on the Detection and Control of Organic Contaminants in Food, Seibersdorf, Austria, 5–16 October 2020.

Final Research Coordination Meeting on the Development of Electron Beam and X Ray Applications for Food Irradiation (DEXAFI) (D61024-CR-4), Vienna, Austria, 19–23 October 2020.

Second Research Coordination Meeting on the Implementation of Nuclear Techniques for Authentication of Foods with High-Value Labelling Claims (INTACT Food) (D52042-CR-2), Kingston, Jamaica, 2– 6 November 2020.

First Research Coordination Meeting on Depletion of Veterinary Pharmaceuticals and Radiometric Analysis of their Residues in Animal Matrices (D52043-CR-1), Vienna, Austria, 9–13 November 2020.

Third Research Coordination Meeting on Field-deployable Analytical Methods to Assess the Authenticity, Safety and Quality of Food (D52040-CR-3), Penang, Malaysia, 23–27 November 2020.

Consultancy Meeting on Irradiation Technology for Phytosanitary Treatment of Food Commodities and Promotion of Trade, Vienna, Austria, 30 November–4 December 2020.

Second Africa Food Safety Technical Meeting, Johannnesburg, South Africa, 30 November–4 December 2020.

International Meetings/Conferences

IAEA Technical Meeting Innovating Radiation Processing of Food with Low Energy Beams from Machine Sources, Dresden, Germany, 12–16 October 2020.

Past Events

Supporting Member State Food Safety Laboratories to Enhance Competence through Proficiency Testing (PT) Schemes

James Sasanya

The FEP has supported several food safety laboratories to participate in a range of PTs including veterinary and pesticide residues, mycotoxins, toxic metals among others, using food, feed, water and associated matrices. Thirty-five institutions in 28 countries in African, Asia and the Latin America/Caribbean are benefiting from this exercise through three PT providers that will deliver material over a period of four rounds starting March 2020 through early 2021.

Demonstrating that a laboratory is competent and does what it says it does well, is critical for customers/clients satisfaction and trust. One of the ways food safety testing laboratories demonstrate such capabilities is through PT schemes. PTs are part of a quality assurance/control programmes in testing and calibration and effective in reassuring that analytical instrumentation, analysts and the whole testing process are reliable.

Besides enabling laboratories continually assess the analytical skills, suitability of instrumentation, methodologies and material used, PTs also contribute towards the process of attaining as well as maintaining of ISO accreditation.

Meeting of the United Nations Inter-Agency Task Force on Chernobyl, United Nations Development Programme, New York, USA, 24 April 2020

Carl Blackburn

The 25th of April marked the thirty-fourth anniversary of the accident at the Chernobyl Nuclear Power Plant. The reporting officer participated in this year's Inter-Agency Task Force (IATF) meeting on Chernobyl. The ITAF was held virtually, by internet video link and chaired by Mr Achim Steiner, United Nations Development Programme (UNDP) Administrator and UN Coordinator of International Cooperation on Chernobyl, and moderated by Ms Mirjana Spoljaric Egger, UNDP Regional Director of the Bureau for Europe and the Commonwealth of Independent States. The IATF is a senior level meeting, held each year to review progress made on Chernobyl-related activities for the past year and provides updates for participants. It was attended by representatives from the governments of Belarus, the Russian Federation and Ukraine, the three most affected countries plus UN agencies, international organizations and other government representatives.

The UNDP thanked participating governments, agencies and organizations for their inputs to the Secretary-General's report "Persistent Legacy of the Chernobyl Disaster" [1] successfully submitted to the 74th UN General Assembly session in September 2019. The recovery efforts achieved by the Governments of Belarus, the Russian Federation and Ukraine for their joint work supported by the international community and to take stock of development activities in Chernobyl affected communities. The UNDP also expressed its gratitude to the 45 nations that provided US$2.2 billion for the new safe confinement structure which should make the reactor complex stable and environmentally safe for the next 100 years.

The Permanent Representative of Belarus reminded the participants that the meeting was taking place on the eve of the International Chernobyl Disaster Remembrance day on 26 April as declared by the General Assembly in December 2016 and regards it as a global acknowledgement of the importance of keeping the Chernobyl Disaster high in the global agenda drawing lessons from the emergency and recovery responses and sharing the experience. The Permanent Representative offered to hold the next IATF on Chernobyl scheduled for April 2021 in Minsk and concluded that international cooperation on Chernobyl remains vital and looks forward to continued cooperation with all partners to mitigate the long-term consequences of the disaster and to achieve the Sustainable Development Goals in the affected regions.

The Deputy Permanent Representative of the Russian Mission to the UN mentioned that Russia remains engaged in planning and implementation of international cooperation projects in Chernobyl, aimed at the social and economic development and rehabilitation of affected areas. The Russian Federation along with Belarus has started a two-year programme of joint activities financed from the Union State of Russia and Belarus resources. Although much has been done to overcome the consequences of the Chernobyl tragedy much more remains to be done. The Russian Federation is determined to further address this issue both in planning of internal policies and development of cooperation with Russia's neighbours. He also used the opportunity to reiterate that the Russian Federation stands ready to consider requests for assistance from the Ukrainian authorities.

[1] https://undocs.org/A/74/461

The head of the State Agency of Ukraine on Exclusion Zone Management mentioned that it is the first time that his agency is attending the IATF meeting. The State Agency provides radiological and environmental safety in the exclusion zone. It is also working to improve the radioactive waste management system plus storage and disposal facilities and on the creation of the needed infrastructure for visitors, preservation of cultural heritage and the conduct of scientific research.

The participant from the IAEA, informed that IAEA technical cooperation programme has provided since 1990 over €1 million in assistance to national and regional projects to help reduce the impact of the disaster in many areas and on several levels. The activities of the IAEA are categorized in three thematic areas namely, environmental radiation of affected territories; risk communication and public information sharing; assistance to Ukraine on safety and technical aspects of decommissioning. Rehabilitation and environmental remediation will continue to be an important focus of the technical cooperation assistance.

The participant from the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, informed the IATF that the FAO, through the Joint FAO/IAEA Division, provides support and technical inputs in the areas covered by its mandate concerning food and production in agriculture, fisheries and forestry sectors. More specifically, in areas of information on remediation of radioactive contamination in agriculture and information management for response and remediation. FAO is also working with IAEA and WHO to develop norms and guidance regarding maintaining food and agricultural standards. It also supports and coordinates research and development activities related to radioactivity in food and agriculture.

United Nations Evaluation of Public Exposure to Ionizing Radiation from Artificial and Natural Sources, Vienna, Austria, 30 March – 1 April 2020

Carl Blackburn

The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), is mandated to assess and report levels and effects of exposure to ionizing radiation to the General Assembly of the United Nations. This meeting was held to start the process of producing an expert evaluation of public exposure to ionizing radiation from artificial and natural sources. The reporting officer was invited to participate and assist the UNSCEAR secretariat and committee experts, as necessary, about radioactivity in food and agricultural products.

The UNSCEAR was established in 1955, its secretariat is based in Vienna and provided by the United Nations Environment Programme (UNEP). The secretariat collates relevant information and engages specialists to analyse data, study relevant scientific literature and produce scientific evaluations for scrutiny at each session of UNSCEAR. The UN has designated twenty-seven countries to provide scientists as members of this Committee [2]. It provides authoritative scientific evaluations and it liaises closely with experts of other international bodies, such as the Joint FAO/IAEA Division, to avoid duplication of efforts to the extent possible. UNSCEAR reports are relied on by governments and organizations throughout the world as the scientific basis for evaluating radiation risk and for establishing protective measures.

This meeting was held by video-link, over the internet. The proceedings largely focused on the process of acquiring, reviewing, compiling and analysing data, plus report writing. The reporting officer offered the support of the Joint FAO/IAEA programme as agreed to be available as a contact person for the expert group. He also outlined the work that the Joint FAO/IAEA Division has done on radioactivity in food and drinking water in collaboration with IAEA and WHO and at the Codex Committee on Contaminants in Food. As regards FAO and information resources, it was mentioned that FAOSTAT has data on food balances for almost all countries of the world, as well as data on the use of fertilizers and that these are examples of information that could support the UNSCEAR assessment (radiation exposure will include human exposure due to the ingestion of radionuclides in food, and from “shine” due to enhanced levels of natural radionuclides in some chemical fertilizers etc).

[2] http://www.unscear.org/unscear/en/about_us.html

Coordinated Research Projects

CRP Reference Number	Ongoing CRPs	Project Officer
D52039	Development and Strengthening of Radio-Analytical and Complimentary Techniques to Control Residues of Veterinary Drugs and Related Chemicals in Aquaculture Products	J.J. Sasanya
D52040	Field-deployable Analytical Methods to Assess the Authenticity, Safety and Quality of Food	S. Kelly A. Cannavan
D52041	Integrated Radiometric and Complementary Techniques for Mixed Contaminants and Residues in Foods	J.J. Sasanya Z. Ye
D52042	Implementation of Nuclear Techniques for Authentication of Foods with High-Value Labelling Claims (INTACT Food)	S. Kelly
D52043	Depletion of Veterinary Pharmaceuticals and Radiometric Analysis of their Residues in Animal Matrices	J.J. Sasanya
D61024	Development of Electron Beam and X ray Applications for Food Irradiation (DEXAFI)	C.M. Blackburn

Mid-Term Progress Report on Coordinated Research Project "Field-Deployable Analytical Methods to Assess The Authenticity, Safety And Quality of Food"

Simon Kelly and Andrew Cannavan

On the 6th of May the Agency's Committee for Coordinated Research Activities in Nuclear Applications (CCRA-NA) formally reviewed the mid-term progress of CRP "Field-deployable Analytical Methods to Assess the Authenticity, Safety and Quality of Food". The Committee agreed that good progress has been made in achieving the objectives of the project. A significant number of feasibility studies have been completed to make preliminary assessments of all of the portable nuclear and complementary techniques identified at the outset of the project. So far, this has resulted in eight peer reviewed scientific publications (seven in international journals and one in a National journal) and a further three manuscripts, which are currently in preparation or have been submitted. Rapid, cost-effective, screening methods have been developed and six method protocols have been shared with the contract holders. Rapid, cost-effective, screening methods were developed for the authenticity of argan oil and to detect adulteration of green tea with colourants using the nuclear technique *headspace gas chromatography-ion mobility spectrometry,* combined with multivariate statistical interpretation of the results. The Technical Officers worked through the Food and Environmental Protection Laboratory (FEPL), in collaboration with the agreement holder Queen's University Belfast (UK), to organize an interlaboratory study involving more than 30 participating institutes in 26 countries to evaluate the low-cost hand-held SCiO 'pocket molecular sensor' device to test oregano authenticity. The study demonstrated the potential transferability of multivariate models built using one SCiO device to correctly identify the authenticity status of oregano samples in other laboratories around the world. This is a very important as the low-cost sensor will massively increase accessibility to food authenticity and safety assessment to our developing member states. Furthermore, project contract holders, from the Semenov Institute of Chemical Physics in Russia, have developed two free software add-ins, with guidance manuals, for Microsoft Excel that permit multivariate analysis of spectroscopic data and these have been distributed through the CRP and training courses funded by a regional cooperation activity in Asia-Pacific leveraging additional outputs and benefit to members states from this project. This CRP has also been used by participant agreement holders to leverage additional national funding such as that from the UK Global Challenges Research Fund - Dr Ilya Strashnov "Mass spectrometry techniques for rapid detection of adulteration of milk powder and vegetable oils in developing countries", which has been used to fund training exchanges and fellowships under the auspices of this CRP. Most importantly the project outputs have already been used to improve National capacities in rapid screening technologies e.g. to control the illegal use of recycled palm oil for cooking in Malaysia. With assistance and leverage offered by the FEPL and participation in this CRP, a collaborative research group has been established between industry stakeholders (Sime Darby Corporation) a Government agency, the Malaysian Palm Oil Board

(MPOB) and the CRP research group. Information was gathered and collated on the different qualities and grades of palm oil as well as procurement of authentic palm oil and its by-products. The establishment of verified and authentic sources of industrial palm oils is essential and fundamental to effective control; having these stakeholders involved demonstrates both the credibility and importance of the work of the CRP. A spin off project is currently in progress due to interests shown by Malaysian Palm Oil Board's Metabolomics Unit in nuclear and nuclear-related techniques to help map the geographical origin of crude palm oils. This is another key issue related to the palm oil industry in Asia in addition to quality and authenticity concerns. This CRP is also putting legacy outputs in place through a technical contract with the Walloon Agricultural Research Centre in Belgium, which has over 30 years of experience in the quality control of animal feed and food using rapid and portable screening techniques. This includes fabrication and distribution of sealed glass units of vegetable oils and milk powder for inter-laboratory spectral calibration, to ensure reproducibility in measurements, and the development of an on-line spectral library of authentic products, which will be used by CRP participants and other member states for food authenticity and safety control.

Technical Cooperation Projects

Country/Region	Project No.	Title	Technical Officer
Algeria	ALG5030	Contributing to the Implementation of the National Agricultural Development Programme Through Strengthening Soil, Water and Nutrient Management Practices Including Food Safety Using Nuclear and Related Techniques	J. J. Sasanya
Angola	ANG5014	Upgrading Laboratory Services for Control of Food Quality for Human and Animal Consumption	J. J. Sasanya Z. Ye
Bahrain	BAH5002	Establishing a National Quality Control Standard for Foodstuffs and Fishery Products	J. J. Sasanya Z. Ye
Burundi	BDI5003	Strengthening National Capacities for Monitoring and Testing Veterinary Drug Residues in Food	J. J. Sasanya
Benin	BEN5013	Expanding Analytical Capabilities for Systematic Control of Veterinary Drug Residues and Related Contaminants in Foodstuff	J. J. Sasanya
Bangladesh	BGD5032	Building Capacity in Improving Food Safety Using Nuclear and Other Complementary Analytical Techniques	S. Kelly Z. Ye
Bahamas	BHA5001	Developing laboratory capacity for testing contaminants in animal and related products including fish in Bahamas	J. J. Sasanya

Country/Region	Project No.	Title	Technical Officer
Bahamas	BHA0002	Establishing a National Quality Control Standard for Foodstuffs and Fishery Products	J. J. Sasanya
Botswana	BOT5017	Enhancing Capabilities for Inter-institutional Monitoring of Chemical Food Contaminants Using Nuclear/Isotopic and Complementary Analytical Techniques	J. J. Sasanya A. Cannavan
Botswana	BOT5020	Enhancing Capabilities for a Holistic Approach to Testing Food Hazards in Poultry Production and Products	J. J. Sasanya Z. Ye
Belize	BZE5011	Strengthening Laboratory Capabilities to Monitor Contaminants in Fisheries Products	J. J.Sasanya
Cameroon	CMR5023	Strengthening Laboratory Capabilities to Monitor Contaminants in Fisheries Products	J. J.Sasanya
Cameroon	CMR5025	Improving Laboratory Testing Capabilities to Enhance the Safety and Competitiveness of Agricultural Products - Phase I	J. J.Sasanya
Colombia	COL5025	Improving Capacity to Diagnose Residual Pesticides and other Contaminants in Exotic Tropical Fruits to Make Food Exports More Acceptable on the International Market	J. J. Sasanya
Costa Rica	COS5036	Improving Analytical Capacity to Monitor Food Contaminants and Veterinary Drug Residues Using Nuclear/Isotopic and Complementary Techniques	J. J. Sasanya
Costa Rica	COS5037	Strengthening Capabilities to Analyse and Monitor Toxic Metals in Animal Products	J. J. Sasanya
Cuba	CUB5022	Promoting Food Safety through the Mitigation of Contaminants in Fruits for Human Consumption	C. M. Blackburn J. J. Sasanya
Dominica	DMI5002	Enhancing Capacity to Monitor Agrochemical Residues in Foods and Related Matrices	D. Battaglia J. J. Sasanya

Country/Region	Project No.	Title	Technical Officer
Dominican Republic	DOM5005	Strengthening National Capabilities to Ensure Food Authenticity	S.D. Kelly
Ecuador	ECU5030	Reducing Post-Harvest Losses of Native Potatoes and other Fresh Foods by Irradiation	C. M. Blackburn
Eritrea	ERI5012	Developing Analytical Capabilities for Food Safety	J. J. Sasanya Z. Ye
Fiji	FIJ5002	Increasing Trade and Export Capacities of Selected Value Chains within the Agro-Food Sector through the Adoption of an Appropriate Quality Infrastructure	C. M. Blackburn Z. Ye
Fiji	FIJ5004	Establishing a Food Safety Laboratory for Analysis of Pesticide Residues in Fresh Fruits, Vegetables and Root Crops	B. M. Maestroni Z. Ye
Georgia	GEO5001	Enhancing National Programmes for Testing and Monitoring Food Contaminants and Residues	J. J. Sasanya
Haiti	HAI5006	Increasing Productivity and Exportability in the Agricultural Sector through Soil and Water Management and Food Safety Monitoring	C. M. Blackburn J. J. Adu-Gyamfi J. J. Sasanya
Haiti	HAI5009	Strengthening Laboratory Capacity to Test and Monitor Food Contaminants	J. J. Sasanya
Iraq	IRQ5021	Developing Food Safety and Assurance System Using Nuclear and Other Related Technologies	J. J. Sasanya A. Cannavan S. Kelly
Cote d'Ivoire	IVC5041	Strengthening Capabilities to Monitor Contaminants in Food and the Environment	J. J. Sasanya
Cambodia	KAM5004	Strengthening National Capability for Food and Feed Safety	J. J. Sasanya D. Battaglia
Kazakhstan	KAZ5005	Building Capacities in Effectively Irradiating Food	C. M. Blackburn
Kyrgyzstan	KIG5001	Establishing Effective Testing and Systematic Monitoring of Residues and Food Contaminants and of Transboundary Animal Diseases	J. J. Sasanya I. Naletoski

Country/Region	Project No.	Title	Technical Officer
Lebanon	LEB1010	Establishing an Isotopic Ratio Mass Spectrometry Laboratory Dedicated to Authentication and Provenance for Supporting the National Fraud Repression Scheme	M. Groening Z. Ye S. Kelly
Lebanon	LEB5016	Strengthening Capacity for Exposure Assessment of Residues and Contaminants in the National Diet	J. J. Sasanya
North Macedonia	MAK5009	Enhancing National Capacities to Standardize Nuclear Based and Related Techniques for Food Safety and Detection of Irradiated Food	A. Cannavan B. S. Han A. Mihailova
Mauritius	MAR5024	Building Capacity to Analyse Veterinary Drug Residues and Related Chemical Contaminants in Animal Products	J. J. Sasanya
Mauritius	MAR5027	Building Capacity to Analyse Veterinary Drug Residues and Related Chemical Contaminants in Animal Products	J. J. Sasanya
Mauritania	MAU5008	Strengthening Laboratory Capacity to Analyse and Monitor Residues and Contaminants in Foods	J. J. Sasanya
Marshall Islands	MHL5002	Building Core Capacities to Control Contaminants and Other Residues in Food — Phase I	J. J. Sasanya Z. Ye
Mongolia	MON5024	Enhancing Food Safety Analytical Capabilities for Veterinary Drug Residues and Related Contaminants Using Isotopic Techniques	J. J. Sasanya D. Battaglia Z. Ye
Montenegro	MNE5004	Strengthening Technical and Institutional Capacities of the National Reference Laboratory for Food and Feed Control	Z. Ye A. Cannavan
Morocco	MOR5037	Enhancing Control of Chemical Food and Feed Contaminants, Animal Disease Diagnosis and Trade in Fresh Fruits	D. Battaglia J. J. Sasanya C. M. Blackburn
Mozambique	MOZ5010	Strengthening Confirmatory Analytical Capabilities for Veterinary Drug Residues and Related Contaminants in Animal Products	J. J. Sasanya

Country/Region	Project No.	Title	Technical Officer
Namibia	NAM5015	Developing Capacity of the National Standard Institution and Agro-Marketing and Trade Agency in the Areas of Food Safety	B. Maestroni A. Cannavan
Namibia	NAM5018	Strengthening Animal Health and Food Safety Control Systems	J. J. Sasanya
Nepal	NEP5007	Supporting Analysis of Pesticide Residues in Agricultural Products	B. Maestroni
Niger	NER5022	Strengthening Nuclear / Isotopic and Complementary Laboratory Capabilities for Monitoring Contaminants in Food, Feed and Water	D. Battaglia J. J. Sasanya
Niger	NER5023	Strengthening Capacity of the Public Health Laboratory to Monitor Food Contaminants	J. J. Sasanya
Vanuatu	NHE5002	Strengthening Agro-Food Laboratory Quality Infrastructure	Z. Ye J. J. Sasanya
Nicaragua	NIC5012	Strengthening the Monitoring and Control System for Food Contaminants	J. J. Sasanya
Oman	OMA5008	Enhancing National Capabilities in Food Safety and Traceability	S. D. Kelly
T.T.U.T.J. of T. Palestinian A.	PAL5010	Strengthening Capability to Monitor Contaminants in Food and Related Matrices through Nuclear and Complementary Analytical Techniques	J. J. Sasanya
Panama	PAN5027	Strengthening Analytical Capabilities for Risk-based Monitoring of Agricultural Products for Internal Consumption	J. J. Sasanya
Philippines	PHI5035	Advancing Laboratory Capabilities to Monitor Veterinary Drug Residues and Related Contaminants in Foods	J. J. Sasanya
Rwanda	RWA5002	Strengthening Laboratory Capacity to Analyse and Monitor Food Contaminants by Standards Board	J. J. Sasanya
Senegal	SEN5038	Strengthening Laboratory Capabilities for Analysing Veterinary Drug Residues and Contaminants in Food	J. J. Sasanya A. Cannavan

Country/Region	Project No.	Title	Technical Officer
Seychelles	SEY5010	Strengthening Laboratory Capabilities to Enhance Food Safety Using Nuclear and Complimentary Analytical Techniques	J. J. Sasanya
Sri Lanka	SRL5048	Strengthening National Capability for Food and Feed Safety	A. Cannavan A. Mihailova
Sudan	SUD5039	Enhancing the Capacity to Monitor Pesticide and Veterinary Residues in Food Using Nuclear and Complementary Techniques	J. J. Sasanya
Sudan	SUD5040	Strengthening the Evaluation of Quality, Monitoring and Control Programmes for Food Contaminants	J. J. Sasanya
Thailand	THA5056	Strengthening Food Safety Laboratory Capacities	J. J. Sasanya D. Battaglia
Uganda	UGA5040	Strengthening Multi-Sectoral Food Contaminant Monitoring Programmes Through the Effective Use of Nuclear, Isotopic and Complementary Techniques	D. Battaglia J. J. Sasanya
Uganda	UGA5042	Strengthening Capabilities of Two Central Food Safety Laboratories and Selected Regional Veterinary Centres of Public Health	D. Battaglia J. J. Sasanya
Viet Nam	VIE5022	Promoting Interlaboratory Comparison and Accreditation in Testing Chemical Contamination for Food Safety	B. M. Maestroni Z. Ye
Zambia	ZAM5032	Strengthening and Expanding Analytical Capacity to Monitor Food Contaminants using Nuclear/Isotopic and Complementary Tools	J. J. Sasanya
Democratic Rep. of the Congo	ZAI5028	Controlling Food and Feed Contaminants in Fish Production	J. J. Sasanya
Africa	RAF5084	Strengthening Food Contaminant Monitoring and Control Systems and Enhancing Competitiveness of Agricultural Exports using Nuclear and Isotopic Techniques (AFRA)	J. J. Sasanya

Country/Region	Project No.	Title	Technical Officer
Asia	RAS5078	Enhancing Food Safety Laboratory Capabilities and Establishing a Network in Asia to Control Veterinary Drug Residues and Related Chemical Contaminants	J. J. Sasanya D. Battaglia G. J. Viljoen
Asia	RAS5081	Enhancing Food Safety and Supporting Regional Authentication of Foodstuffs through Implementation of Nuclear Techniques (RCA)	S. Kelly Z. Ye
Asia	RAS5087	Promoting Food Irradiation by Electron Beam and X Ray Technology to Enhance Food Safety, Security and Trade (RCA)	C. M. Blackburn
Latin America	RLA5069	Improving Pollution Management of Persistent Organic Pollutants to Reduce the Impact on People and the Environment (ARCAL CXLII)	B. M. Maestroni J. J. Sasanya
Latin America	RLA5079	Applying Radio-Analytical and Complementary Techniques to Monitor Contaminants in Aquaculture (ARCAL CLXXI)	J. J. Sasanya
Latin America	RLA5080	Strengthening the Regional Collaboration of Official Laboratories to Address Emerging Challenges for Food Safety (ARCAL CLXV)	B. M. Maestroni A. Cannavan
Latin America	RLA5081	Improving Regional Testing Capabilities and Monitoring Programmes for Residues/Contaminants in Foods Using Nuclear/Isotopic and Complementary Techniques (ARCAL CLXX)	J. J. Sasanya
Inter-Regional	INT5154	Improving Food Safety through the Creation of an Interregional Network that Produces Reliable Scientific Data Using Nuclear and Isotopic Techniques	J. J. Sasanya D. Battaglia

Data Sharing within RLA5080 "Strengthening the Regional Collaboration of Official Laboratories to Address Emerging Challenges for Food Safety (ARCAL CLXV)"

Britt Maestroni and Nicola Schloegl

The recent corona virus pandemic has highlighted the extreme need for transparent information, including the provision of data generated worldwide. Sharing of epidemiological data has been fundamental to establishing mitigation measures and to counterbalance the expansion of the pandemic. Similarly, in a food safety emergency, reliable and sufficient data must be available for the management of the crisis.

Digital technologies are transforming the approach to governance and public management. To a large extent innovation in the public sector and the delivery of efficient and effective public services is driven by the access and sharing of data. According to a study carried out by the Organization for Economic Co-operation and Development (OECD) in 2015, most of the countries in the region of Latin America and the Caribbean had a national strategy for digital government in place. Nevertheless, despite the potential benefits, challenges remain in the implementation of the strategies in all areas of the public sector.

As one of the initiatives in the area of food safety and to establish preventative measures to tackle emerging challenges in this area, the Analytical Network of Latin America and the Caribbean (RALACA) has started focusing its work on the concept of data sharing. with a long-term view to pave the way to the establishment and deployment of an early warning system for food safety, enabling countries to take preventative approaches, including the establishment of monitoring programs and management decisions based on risk-based evidence and assessments.

As in other sectors, the sharing of food safety data among the countries in the region of Latin America and the Caribbean bears several benefits: It opens the possibility for carrying out secondary analysis (i.e. gap analysis) of data, enhances efficiency and effectiveness in the management of food safety and strengthens south-south cooperation in the region. The scoping, recompilation and cataloguing of different types of data and information generated by different national institutions leads to optimized allocation of resources and ultimately improved data quality.

Since January 2020, the RALACA network has been supporting the IAEA as partner in the implementation of the regional technical cooperation project RLA5080 on "Strengthening the Regional Collaboration of Official Laboratories to Address Emerging Challenges for Food Safety". The project, which was proposed and adopted in the framework of the Regional Agreement for the Promotion of Nuclear Science and Technology in the Region of Latin America and the Caribbean (ARCAL) has the objective to promote the establishment of a regional Data Sharing Committee (DSC). The idea behind this initiative is to create awareness among stakeholders in the area of food safety on the benefits of a common repository of food safety data and of making data available and accessible to regional decision-makers.

Basic assumptions in the establishment of the regional database are that the data are timely, accurate, reliable and secure, and that rights, integrity and confidentiality are protected. Data would be shared in an aggregated manner, and in accordance with the institutional policies and international standards, e.g. ISO 17025.

In this context, the following benefits for data sharing for food safety are to be highlighted:

- Maximization of the utility of datasets;
- Improvement of the data quality;
- Minimization of inequity in data access and reuse for secondary analysis;
- Aggregated data visualization as a basis for evidence-based decision making and the formulation of policies in food, agriculture and health;
- Improvement of the transparency of food safety information at the regional level;
- Increase of research and development (R&D) in the area of food safety;
- Improvement of the institutional position in the application for donor funding for food safety;
- Strengthened collaboration with likeminded institutions;
- Increased visibility of work amongst regional food safety stakeholders.

The role of the RALACA-DSC is to facilitate the work of national institutions on scientific and practical matters related to the collection, analysis and reporting of data arising from the results of chemical monitoring in food.

Ultimately the national authorities analyse the data, assess the results of monitoring programmes conducted by the countries and perform exposure assessment.

In this endeavour, the RALACA-DSC can significantly benefit from the support of potential international and regional partners, such as the Food and Agriculture Organization (FAO), the Inter-American Institute for Cooperation on Agriculture (IICA), the Organismo internacional regional de sanidad agropecuaria (OIRSA) or World Health Organization (WHO) as well as the experiences of the European Food Safety Authority (EFSA), which has already a well-established food safety database used for risk assessments.

A meeting under the regional project RLA5080 is planned to take place in Panama during 2020 with the objective to

define the structure and mandate of the DSC in food safety, as well as the terms of reference of the IT platform. The meeting will be an opportunity to discuss current challenges, experiences and good practices in the establishment and the implementation of a regional database for food safety among project counterparts from the region of Latin America and the Caribbean (LAC) together with partner organizations from LAC and other regions.

Sessions will involve expert presentations, ad hoc working groups and open discussion sessions focused on the strategy to achieve project outputs including the operational framework of RALACA-DSC. Expected outputs from the meeting are a clearly defined organizational mandate and structure of the data sharing committee; the definition of a technical working methodology of the committee; and terms of reference for the elaboration of the data sharing platform for food safety.

The FEPL, through the Technical Officer of project RLA5080, will contribute by providing independent advice and helping to maintain and ensure timely, accurate, reliable, secure, data and confidentiality for all the Member States that wish to contribute to this initiative. In addition analytical methods are being shared through RALACA[3] and the IAEA Food Contaminant and Residue Information System (FCRIS) initiative[4].

Strengthening Food Safety in Namibia and Zimbabwe through a Laboratory Partnership

James Sasanya

Food safety testing laboratories can be at different levels of growth and development in specific analytical capabilities and can therefore need to benefit from each others' areas of strength. A triangular food safety technical cooperation project involving the Central Veterinary Laboratory (CVL) in Zimbabwe and its counterpart the CVL in Namibia, supported by the FEP is currently facilitate sharing of knowledge and experiences between these two institutions.

For instance, through this interaction CVL, Namibia is benefiting from Zimbabwe's good laboratory quality management system including working towards improving internal auditing; personnel involvement and engagement in development and review of quality management system; streamlining the size of documentation; reviewing the procedures and stepwise instructions that are easy to follow in a testing laboratory. This follows training undertaken in a range of areas including: Introduction to ISO 17025 (Understanding role of laboratory and importance of accreditation; Key management system (MS) perspectives: Understand ISO 17025 standard versions and reasons for change from 2005 to 2017 version; Critical success factors to develop and implement an effective MS: Most critical factor is support and commitment of management and other critical factors; Development of Policies Procedures and Records: fundamentals of MS documentation; Development of equipment operating procedures and maintenance procedures; Attaining and maintaining accreditation; Handling of non – conformities; Developing and implementation of MS: team engagement; Root Cause analysis and opportunity identification

Staff of both institutions have also visited each other's laboratories to learn on-site. Three CVL, Namibia recently spent a couple of weeks at the Quality Section of the CVL, Zimbabwe to enhance knowledge and capabilities on the administration and implementation of the management system.

The CVL Zimbabwe has on the hand benefited from improving analytical skills for testing residues and contaminants. Six of their analytical and management staff have visited CVL, Namibia and improved knowledge and skill in the analysis of drug and pesticide residues, including national monitoring programmes as well as instrumentation. The Agency has provided technical support as well laboratory instrumentation and material to facilitate implementation of the knowledge and experiences shared. This cooperation is ongoing.

Zimbabwean analysts training in Namibia.

A Regional (Latin America and the Caribbean) Food Safety Project on Aquaculture Launched — First Coordination Meeting, Toluca, Mexico, 9–13 March 2020

James Sasanya

A new regional (Latin America and Caribbean) food safety project focussing on residues/contaminants in aquaculture production, products and associated matrices such as water and feed has been launched. The overall objective is to

[3] http://www.red-ralaca.net/

[4] https://nucleus.iaea.org/sites/fcris/Pages/Submit-Pesticide-Residues-Method.aspx

contribute to increasing safe and sustainable aquaculture-food production in Latin America and the Caribbean countries, while the expected outcome is improved programmes for determination of levels and distribution patterns of contaminants in aquaculture production and products and implementation of protocols for better practices. Participating countries thus far include: Argentina, Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

The first coordination meeting was held at the Instituto Interamericano de Tecnología y Ciencias del Agua (IITCA) and included ~30 participants from all the MSs (except Brazil) and IAEA staff including the Technical Officer. Presentations were delivered on residues/contaminants in aquaculture; how to ensure project success/impact; Nuclear/isotopic techniques or methods for water, food and feed safety/quality (in relation to aquaculture production); and information on the benefits of adopting best practice protocols based on levels and distribution patterns of contaminants.

There was elaborate focus on programmes for determination of levels and distribution patterns of residues and contaminants in aquaculture production and products, as well as how protocols for better production practices are or would be implemented.

Baseline data was generated from the counterparts and their collaborating institutions in areas such as: Institutions and mandates; hazards of interest; the matrices (foods etc); national legal framework; instrumentation and methods; human resource; quality management system; existence or not, of national monitoring programmes; collaborating institutions; relation of the project to national public health and trade; challenges in the aquaculture sector; project needs; willingness to host project activities; plans to determine socio-economic impact.

Further deliberations were held to address needs, opportunities and challenges in the region concerning specific thematic areas under the project.

RLA5079 participants at the first Coordination Meeting in Toluca, Mexico.

Training on Mycotoxin Analysis in Mauritania, 24–28 February 2020

James Sasanya

Analytical capabilities needed to ensure more effective testing of mycotoxins in food and feed in Mauritania have been enhanced through an on-site training that involved six analysts from two institutions Institut National de Recherches en Santé Publique (INRSP) and Office National de Recherche et de Dévelopement d'élevage (ONARDEL). The training and lectures covered a range of mycotoxins including aflatoxins, ochratoxins, fumonisins, deoxynivalenol, with focus on production, detection and impact on health as well as trade.

INRSP plays a key role in the public health system in Mauritania and close collaboration that has been promoted through the technical cooperation programmes is expected to enhance testing and monitoring of mycotoxins particularly aflatoxins in the country.

Further technical and financial support to facilitate establishment of cost-effective screening and confirmatory analytical tools is ongoing. Plans are also underway for the counterpart institutes to conduct awareness campaigns to help stakeholders better appreciate the potential health impacts of mycotoxins. Agency support is also expected to facilitate the process of ISO 17025 accreditation.

Participants on a training on mycotoxin analysis in Mauritania.

Training to Strengthen Food Safety Testing in Cambodia, 27–31 January 2020

James Sasanya

Support was recently provided to the National Animal Health and Production Research Institute (NAHPRI), General Directorate of Animal Health and Production, Phnom Penh, Cambodia, to improve capacity to test veterinary drug residues in animal products as well as mycotoxins. Five analysts benefited from two training programmes. The first national training workshop (27–31

January 2020) focussed on hands-on exercises and lectures on: the effective use of radioreceptor assays for the detection of antimicrobial residues in food of animal origin; other matrices and contaminants (e.g. mycotoxins); overall residue testing and monitoring using screening tools; and introduction to screening and its significant role in residue monitoring and relationship to trade.

Personnel were instructed on optimization of the protocols and received advice on the safe handling of radio-labelled reagents and how to check contamination. At the end of the workshop laboratory analysts improved their knowledge in residue analysis based on competitive receptor tests using a radio-active tracer (H3 or C14) and felt more confident to use the test in routine analyses.

A second (ten-day) workshop was also conducted on confirmatory LC-MS/MS techniques with focus on: use of UPLC-mass spectrometry including isotopic internal standards, for analysis of veterinary drug residues such as antimicrobials (including but not limited to aminoglycosides) in selected animal products; cost-effective sample preparation; basic instrument calibration, maintenance and troubleshooting; data processing/analysis and reporting; role of laboratory in residue monitoring; single laboratory method validation; quality assurance and control in a residue-testing laboratory.

Trainees in a Cambodia Food Safety Lab.

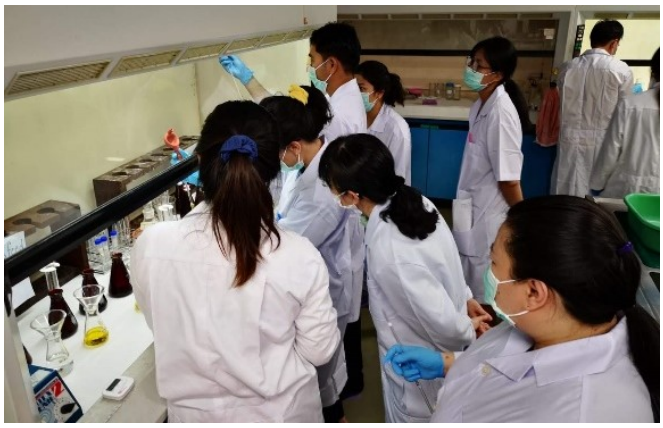
Staff can now better conduct confirmatory tests for a range of veterinary drug residues in animal products such as chicken, pork and eggs, and can resolve or identify basic LC-MS/MS issues. Further support is also ongoing.

Enhancing Capacity to Test Mycotoxins in Food and Animal Feed in Thailand, 27–31 January 2020

James Sasanya

While Thailand's Veterinary Public Health Laboratory, Bureau of Quality Control of Livestock Products has strengthened its analytical capabilities for residue analysis, one area that needs support is testing of mycotoxins in food and feed. Therefore, a national training was conducted on food/feed contaminants in Pathunthan, Thailand to fill the gap. A total of 29 participants from different public organizations in Thailand attended the training course whose specific objective was to enhance analytical testing capabilities of national reference laboratories in Thailand, working on monitoring programmes of food/feed contaminants.

The training was structured as follows: hands-on training, provide lectures and guide discussions on; analysis (including sampling, sample preparation and instrumentation) of selected mycotoxins in food and animal feed; Use of isotope-labelled compounds in chromatographic-spectrometric techniques; determination of aflatoxin M1 in milk; ochratoxin in animal products, and the determination of multiple-mycotoxins in feed by isotopic LC-MS/MS. Three standard operating procedures for necessary analytical methods were provided/used to the course participants. This training will greatly enhance national programmes for regulation of aflatoxins in food and feed and facilitate the process of collecting occurrence data on mycotoxins to support the government in setting maximum permitted levels. Further technical and financial support is anticipated.



Training on mycotoxin analysis in Thailand.

Interregional Food Safety Project Concludes: Final Coordination Meeting, Jakarta, Indonesia, 22–24 January 2020

James Sasanya

A 4-year inter-regional food safety technical cooperation project INT5154 involving the following 29 Member States (MSs): Angola, Argentina, Benin, Bolivia, Botswana, Cameroon, Chile, Costa Rica, Cuba, Ecuador, Egypt, Guatemala, Honduras, Indonesia, Lebanon, Mongolia, Mozambique, Nigeria, Pakistan, Seychelles, Singapore, South Africa, Sri Lanka, Tunisia, Turkey, Uganda, United

Republic of Tanzania, Uruguay and Venezuela has been concluded.

The project aimed at enhancing capabilities for MSs to boost their food safety systems, safeguard consumers and trade, through cross-regional training and effectively contributing to setting of national and international guidelines that influence public health and competitiveness of food exports. The project also aimed at producing reliable scientific data capable of influencing the current international standards and to provide the participating countries with the needed capacity to implement the existing standards. The project also facilitated sharing of knowledge and experiences to overcome common trade and public health challenges by supporting other regions or countries lagging in capabilities.

The final coordination meeting was held in Jakarta to review work done and facilitate preparation of final project report. The Technical Officer joined project counterparts from Benin, Costa Rica, Ecuador, Honduras, Indonesia, Lebanon, Mongolia, Morocco, Sri Lanka, Tunisia, Turkey, Uruguay and Uganda at the meeting in Indonesia. The participants were composed of mostly deputy designated team members, group leaders and regional representatives. The scope of work included: Presentations and deliberations on project implementation and reporting as well as laboratory analytical work (and coordination) on all residues and contaminants in foods and associated matrices identified under the project. Experiences and lessons learnt from the project and how to sustain the benefits of the work done, were also discussed and strategies identified. Each country-presentation was reviewed and individual country, regional and interregional discussed. Information from other countries that couldn't attend was evaluated and collated to form the final report. The officer provided relevant technical guidance and assisted with preparation of the meeting and project report.

Participants of the INT5154 Final Coordination Meeting in Jakarta, Indonesia, Jan 2020.

The counterparts shared the benefit of the project including impacts and it was concluded that the project contributed to improvement of MS' food safety control systems from consumer protection and trade perspectives. Eighty-six (86) analytical methods were accredited/validated, and 22 countries attained or maintained ISO accreditation. More than 13 countries have established or maintained national monitoring programs for residues or contaminants, and a good number of these support not only public health programs, but help maintain food exports and trade as well. Ninety-eight (98) scientists can be regarded to have higher level of expertise thanks to the project INT5154 although in general, over 400 persons were trained in various food safety aspects.

Relevant data on residues and food contaminants, have been generated including baseline information on veterinary drug residues, pesticides residues, mycotoxins and toxic metals in various foods such as cocoa and related products. The project has also promoted interregional collaboration among the MSs across continents and this is useful in addressing common challenges associated with food safety standards that impact trade and public health. All the countries involved use international standards under the Codex Alimentarius system (International food code). These require active participation and contribution by all countries although developing countries tend to face challenges in making meaningful contribution such as the provision of scientific information collected from testing of foods for residues, and in attending meetings of risk managers and assessors through which the standards are formulated. INT5154 provided an avenue through which many of the participating countries made some significant contributions.

First Coordination Meeting –ARCAL Project: Improving Regional Testing Capabilities and Monitoring Programmes, Vienna, Austria, 16–20 December 2019

James Sasanya

A new ARCL food safety project RLA5081 "Improving Regional Testing Capabilities and Monitoring Programmes for Residues/Contaminants in Foods Using Nuclear/Isotopic and Complementary Techniques" was launched in 2020 following a coordination meeting held 16–20 December 2019, in Vienna, Austria. This project whose main objective is " to enhance the safety of foodstuff in Latin America and the Caribbean and where possible boost trade of foodstuff" involves counterparts from: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

The project is expected to ensure that food safety control capabilities in the region are improved. The minimum outputs include and increased number of competent laboratories to analyze food contaminants and residues and that monitoring programs are improved.

The first coordination meeting among others looked at: residue/monitoring programmes in the country for both animal and plant products (if none exists, what the plans and gaps are); associated laboratory capabilities and competencies for analysis of residues and contaminants in both animal and plant products; current role of the

laboratories in contribution to national and international standards (setting and implementation).

Enhancing Analytical and Monitoring Capabilities for Residues in Food in Angola, 16–20 December 2019

James Sasanya

Support has been provided to the Institute of Veterinárian Investigation (IIV) in Huambo, Angola to facilitate testing of residues and contaminants in foodstuff. Two on-site training programmes were recently implemented to ensure optimum use of analytical instrumentation. The first included hands-on training, demonstrations, presentations and discussions on: analysis of residues/contaminants in selected foodstuff using UHPLC and radio receptor assay techniques; sample preparation; data analysis, interpretation and reporting; linkage of laboratory work to national hazard tests programmes.

Training on Residue Analysis.

Following the training, participants appreciated optimum operation and troubleshooting of the available instruments and can analyse some veterinary drug residues including sample preparation; data analysis, calculation, interpretation and reporting of test results. Participants also understood how to validate analytical methods.

The second training focused on introducing a residue monitoring programme and this included: overview of the global challenge of residues and contaminants and classification and importance of residue and contaminants. Specific case-studies and experiences of residue and contaminant monitoring in neighboring countries such as Botswana and Namibia were shared with a number of stakeholders in Angola. The importance of other stakeholders (besides the testing laboratory) in chemical residue monitoring i.e., the veterinary field services, animal owners and abattoir staff was emphasized. Advice was also provided on the need to establish the legal basis of residue monitoring and how to cascade it to all stakeholders and the public at large. Additional areas of work included: diversity of food on the market and risks of contamination; defining screening and confirmatory testing in terms of national residue monitoring programme; middle and long-term progress in food quality control and a proposed plan for establishing an Angolan residue and contaminants monitoring.

Coordination Meeting for an AFRA Food Safety Project, Dakar, Senegal, 9–12 December 2019

James Sasanya

The final coordination meeting for a four-year AFRA food safety project (RAF5078) was held to review and discuss overall project achievements at national and regional levels; prepare a comprehensive project achievement report; and to deliberate on relevant prospects and opportunities on enhancing food safety control systems in Africa. The event was co-organized by the l'Ecole Inter-Etats des Sciences et Médecine Vétérinaires de Dakar (EISMV) and le Laboratoire de Contrôle des Médicaments Vétérinaires (LACOMEV).

The meeting was organized into plenary and breakout group activities to discuss various aspects including: challenges encountered and possible/practical solutions (including recommendations); main achievements versus the planned project outcome and outputs and overall impact with sellable benefits; competence (staff & equipment); laboratory accreditation and excellence including certified reference material (CRMs) and proficiency testing (PT) material accessibility and/or production.

RAF5078 Project Coordination Meeting in Session.

It was noted that counterparts made optimum use of the project, strengthening their food testing laboratories and thus national control systems and a wider and functional network of food safety laboratories using nuclear and complementary analytical techniques and

meeting international standards. Twenty-one countries now have better capabilities to test a range of food hazards in different food matrices without sending them outside the country, especially overseas. Ten of the participating countries have developed capacity to train other food safety scientists from the region. Two countries, South Africa and Egypt can produce and provide PT material following ISO17043 accreditation requirements. Four other countries, Benin, Botswana, Morocco and Nigeria were trained (train-the-trainer) in preparation of PT and CRM material and are expected to train others.

The project group discussed further plans for the region to: further develop in newer areas such as PTs/CRMS for residues and contaminants as well as other hazards; ensure accreditation of many more laboratories; conduct specialized technical trainings in targeted/critical areas such as maintenance and troubleshooting of instrumentation; further develop continental capacity in confirmatory analysis and data collection for residues and contaminants, among others.

Supporting Food Safety Laboratories in Senegal, 4–6 December 2019

James Sasanya

The officer undertook a mission to Dakar, Senegal from 4 to 6 December 2019 to among others: assess implementation of a concluding national TC project on food safety (SEN5038) hosted by the Laboratoire de Contrôle des Médicaments Vétérinaires (LACOMEV) de l'Ecole Inter-Etats des Sciences et Médecine Vététrinaires (EISMV) de Dakar"; provide technical guidance; meet stakeholder institutions; and prepare/review a project report.

The officer also visited and provided support to collaborating institution including Ceres Locustox (Centre Regional De Recherches En Ecotoxicologie Et Securite Environnementale), Laboratoire National d'Analyses et de Controle (LANAC) and Ministry of Fisheries and Marine Economy, Directorate of Industries or Fisheries Transformation (DITP).

A range of topics were covered including optimum use of LACOMEV's analytical capabilities to test a range of residues/contaminants in products for export and local consumption as well as supporting other institutions in the country and the region. Besides a newly developed programme for residues in aquaculture and animal products, an additional interest noted was the analysis of biotoxins and establishment or strengthening of rapid field screening laboratories. Following a presentation by DITP staff, immediate support including procurement of much-needed testing material and equipment was arranged by the officers.

DITP appreciated the Agency's support for a scientific visit by a staff member to Indonesia. This was aimed at improving the fisheries and aquaculture sectors in Senegal as well as the monitoring of residues/contaminants. The knowledge acquired is said to be helping to improve the country's aquaculture sector.

During a visit to LANAC, the officer noted current work on testing of chemical and microbial hazards. The institution thanked the Agency for support in human resource development including training in Morocco that has enabled expansion of testing capabilities. LANAC has been accredited and increased samples analyzed from 1500 to 5000 after accreditation, with the number of customers also increasing.

The officer visited Ceres Locustox and assessed Agency capacity-building support provided. The laboratory analyses pesticide formulations and their residues in foods as well as animal feed. While Ceres Locustox is under Ministry of Agriculture, one of its major clients is the Ministry of Environment. The officer advised that Ceres Locustox and LACOMEV immediately develop plans to start confirmatory analysis of large numbers of food samples Ceres Locustox is mandated with. The two institutions agreed that samples would be collected by Ceres Locustox and be delivered to and analyzed by LACOMEV since Ceres Locustox lacks the confirmatory analytical tools. Laboratory analysts from Ceres Locustox will support sample preparation and testing. This is expected to greatly boost routine testing of food and environmental samples including exports. The officer also discussed a Laboratory Information System procured under the project, including installation plans at Ceres Locustox.

Technical Officer visits the CERES Locustox.

Developments at the Food and Environmental Protection Laboratory

Multispectral Imaging – a New Rapid Complementary Technique for Food Authenticity Screening at FEPL

Alina Mihailova, Simon Kelly and Marivil Islam

A new VideometerLab four multispectral imagining (MSI) system was commissioned in the Food and Environmental Protection Laboratory (FEPL) in February 2020.

Multispectral imaging is an innovative and non-destructive technique that combines imaging and spectral technologies with advanced digital image analysis, machine learning and multivariate statistics (Figure 1). Using strobed light-emitting diode (LED) technology the VideometerLab combines measurements at up to 20 different wavelengths into a single high-resolution spectral image, permitting fast and accurate characterization of foods in terms of colour, surface chemistry, texture, shape, and size without touching the sample and with little or no sample preparation.

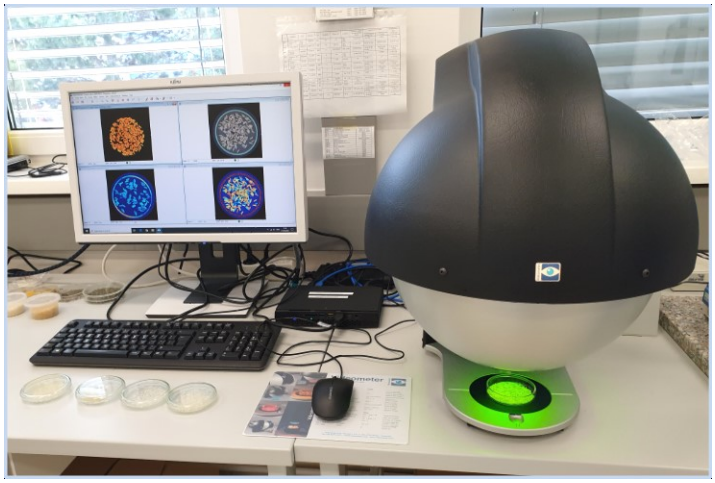


FIG. 1. VideometerLab 4 multispectral imaging system at FEPL.

The VideometerLab system uses wavelengths in the range from 365 to 970 nm, covering the ultraviolet (UV) through to the near-infrared (NIR) bands. UV reflectance and fluorescence information may also be collected. Figure 2 shows a schematic illustration of the system and its main components. The sample is placed underneath a sphere with a matte white inner coating or so-called Ulbricht sphere. Inside the sphere there are LEDs that are positioned side by side in a pattern that distributes the LEDs of each wavelength evenly across the whole perimeter of the sphere. This allows the sample to receive a uniform and diffuse light and to minimize shading effects and specular reflections. Before data acquisition is commenced, the system is calibrated both radiometrically and geometrically. This is followed by the light setup, which allows the instrument to obtain the optimal dynamic range for all LEDs as well as to minimize the distortions in the camera lens. During data acquisition, the sphere lowers and covers the sample and the diodes strobe successively resulting in a high-resolution image for each wavelength. The data acquisition is very fast - the system measures more than 12 million spectra in a sample in less than one second. Once the image processing method has been set up for a particular application, the analysis of a sample takes approximately 10 seconds. The built-in machine learning allows the user to automatically detect and quantify non-conforming food products in terms of count, area and/or volume. The images are produced with high accuracy and reproducibility, which allows the instrument to be used for comparative studies of time series and for large sets of samples.

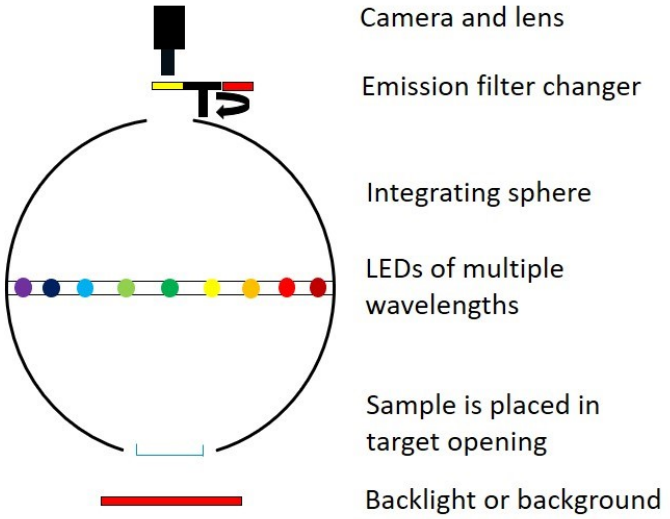


FIG. 2. Schematic illustration of the VideometerLab setup. Image source: Videometer A/S (Denmark).

MSI has been used for a wide range of applications in the areas of food and feed, pharma and cosmetics, microbiology, textiles and forensics. In the area of food safety and authenticity, MSI has been applied for the detection of food adulteration, e.g. the presence of olive leaves in oregano, rice-shaped plastic particles in rice, pork meat in beef, ground peanut in ground almond, and peanut flour in wheat flour. The technique has also been used for the detection of food contamination with fungi (e.g. *Fusarium* head blight in cereals), bacteria, parasites, heavy metals, packaging chemicals and foreign objects (e.g. stones and metal pieces). In addition, MSI allows food quality assessment and the detection of food spoilage (e.g. olive oil rancidity), the assessment of ripeness and maturity of crops as well as evaluation of food processing quality (e.g. roasting stages of coffee, nuts etc.).

MSI offers an untargeted multi-analyte screening approach, very fast sample analysis, and low operational costs. This makes the technique suitable for rapid authenticity

screening, which complements the existing analytical approaches that are being developed and used at FEPL, under CRP D52040 'Field-deployable Analytical Methods to Assess the Authenticity, Safety and Quality of Food' and transferred to Member State laboratories.

FEPL is currently in the process of using the VideometerLab system to develop methods for the differentiation of rice varieties and the detection of the adulteration of more expensive rice varieties with cheaper ones. Future applications may include the authenticity screening of coffee, spices and edible oils and the early detection of moulds associated with mycotoxin production. Some of this research work will be the presented in future editions of the FEP newsletter. Visiting scientists, fellows and interns will have an opportunity to learn the analytical methods and operation of the VideometerLab system, thereby supporting Member State training efforts and raising awareness of this highly accessible and novel rapid screening technology.

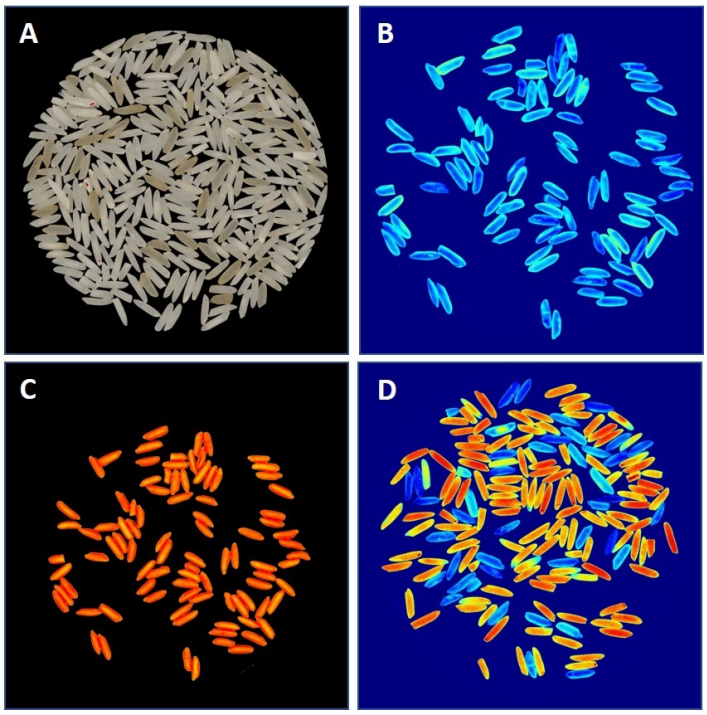


FIG. 3. Multispectral images of rice obtained at FEPL: A – raw image of mixed Basmati and long grain rice; B – transformed image of long grain rice; C – transformed image of Basmati rice; D - Basmati and long grain rice discriminated in an unknown sample.

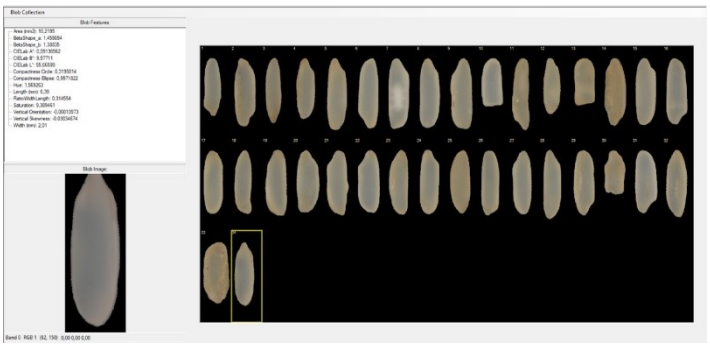


FIG. 4. Individual rice grains extracted from an image of mixed rice.

Innovation Award for Quality Control of Edible Bird's Nest in Malaysia

Simon Kelly, Marivil Islam and Aiman Abrahim

Edible bird's nest (EBN) ranks among the world's most expensive animal products for food and medicinal uses, providing strong economic motivation for its adulteration and mislabelling of origin. Through participation in both research and capacity building of IAEA projects, including training on the development and application of analytical techniques in the FAO/IAEA Joint Division's Food and Environmental Protection Laboratory (FEPL), Malaysia has introduced effective testing for control of their high-quality edible bird's nest products to help promote and protect the reputation of this important export commodity.

The research activities of the Malaysian scientists, in collaboration with FEPL, were recognised at the 30th International Invention, Innovation and Technology Exhibition held in Kuala Lumpur in May 2019. The award of the silver medal for the 'Site-Trace of Malaysian Edible Bird's Nest' project. The collaboration has also led to a publication in the international peer-reviewed journal Forensic Chemistry, titled "Screening Malaysian edible bird's nests for structural adulterants and geographical origin using Mid-Infrared – Attenuated Total Reflectance (MIRATR) spectroscopy combined with chemometric analysis by Data-Driven – Soft Independent Modelling of Class Analogy (DD-SIMCA). The technical capacity and lessons learned through the cooperation project on EBN are now being applied to promote and protect another Malaysian premium product with added value – stingless bee honey.

The ITEX2019 Silver Medal awarded to the Malaysian team for innovation in edible bird's nest quality control

Untargeted Metabolomics Analysis for The Discrimination Between Organic and Conventional Orange Juices - Method Development Work at FEPL

Alina Mihailova and Marivil Islam

Currently no routine authenticity testing is carried out on organic products before they reach the consumer. The verification of organic production relies predominantly on certification processes and regular farm inspections. Significant cases of fraud, where conventional produce has been mislabelled and passed off as organic, on a large scale, have been reported over the past several years in Europe and worldwide (e.g. Europol/Interpol reports). For consumer confidence and the integrity of the whole organic food and drink supply chain it is therefore highly important that, in addition to certification, the claimed specifications of foods can be analytically verified in an objective and independent way.

Various analytical techniques have been applied over the past decade for the authentication of organic products. Stable isotope and elemental analysis have been the most widely tested approaches, however successful verification of organic production often cannot be achieved based solely on these techniques. Current thinking is that the authentication of organic food products is unlikely to be achieved by the measurement of a single or only a few selected markers.

The growing number of studies on the use of untargeted metabolomics report that this analytical approach has potential for differentiation between organically and conventionally grown crops. A wide range of primary and secondary metabolites, including phenolic compounds, organic acids and amino acids, have been reported to differ significantly between organic and conventional crops and could serve as potential discriminant markers. Therefore, more well-designed studies are required to assess the applicability of the untargeted metabolomics approaches for organic food authentication. In addition, the combination of untargeted metabolomics and stable isotope analysis, has been shown to produce robust classification models and would warrant further investigation in future.

FEPL has been doing method development and optimization for untargeted metabolomics analysis using UPLC-QTOF-MS for the authentication of organic orange juices from Mexico. This work supports CRP D52042 " Implementation of Nuclear Techniques for Authentication of Foods with High-Value Labelling Claims ".

Method development and optimization has been performed using commercial organic (n=2) and conventional juice samples (n=2). Different sample extraction and UPLC elution methods have been tested and compared (Table 1). All described extraction methods involved extract centrifugation at 25,000 rpm for 10 min and filtration (0.22 µm PTFE membrane filter) prior to analysis. In addition, UPLC settings have been optimized by comparing different parameters of the elution, e.g. different elution gradients, flow rates and column temperatures. Different MS settings, e.g. capillary, sampling cone and extraction cone voltages were also optimized. Figure 1 shows an example of MS chromatograms of conventional (A) and organic (B) samples in ESI- mode.

The data acquired using all methods were compared and assessed for run alignment, drift, total number of compound ions, repeatability, the discriminative power and goodness of fit of the principal component analysis (PCA) models. From seven extraction methods tested, extraction with methanol (Method 2, Table 1), methanol: acetonitrile (Method 6, Table 1) and no sample extraction (centrifugation and filtration only, Method 7, Table 1) were found as most suitable and gave the highest amount of compound ions detected.

Results of the comparison of UPLC elution methods showed that the elution with methanol resulted in a more pronounced drift of the pooled quality control (QC) samples in a sample batch compared to the elution with acetonitrile, regardless of which solvent was used for sample extraction. Acetonitrile and ultrapure water + 0.1 % formic acid (Method C, Table 1) was selected as the best elution method and showed the least drift and best repeatability.

Methanol extraction (Method 2, Table 1) and elution with acetonitrile (Method C, Table 1) overall gave the highest amount of compound ions, best alignment of the sample runs and best repeatability. Figure 2 shows the PCA graph of organic, conventional and QC samples extracted and analysed using the above methods. All four juice samples (two organic and two conventional) are well separated. The separation between organic and conventional samples are likely to be attributed (but may not be limited to) to the cultivation system. The separation between two types of organic (as well as two types of conventional) samples may be related to the differences in the country of origin and orange fruit variety of the commercial juice samples used for method development. This may be a limiting factor for the application of the untargeted approach when analysing real-life samples and will need to be assessed during further work. The selected method will be applied for the analysis of orange juice samples from Mexico supplied by the fruit juice industrial association SGF. Results from this work will be the presented in future editions of the FEP newsletter.

TABLE 1. SAMPLE EXTRACTION AND UPLC ELUTION METHODS TESTED

Sample extraction	Extraction solvents	Solvent: sample ratio, %
Method 1	Methanol	40:60
Method 2	Methanol	50:50
Method 3	Methanol + 1% FA	40:60
Method 4	Methanol + 1% FA + 5 min sonication	40:60
Method 5	Acetonitrile	40:60
Method 6	Methanol: Acetonitrile, 50:50	40:60
Method 7	No solvent	0:100

UPLC elution	Aqueous solvent (A)	Organic solvent (B)
Method A	10mM Ammonium acetate	Methanol
Method B	Ultrapure water + 0.1% FA	Methanol + 0.1 % FA
Method C	Ultrapure water + 0.1% FA	Acetonitrile + 0.1 % FA

FA – formic acid

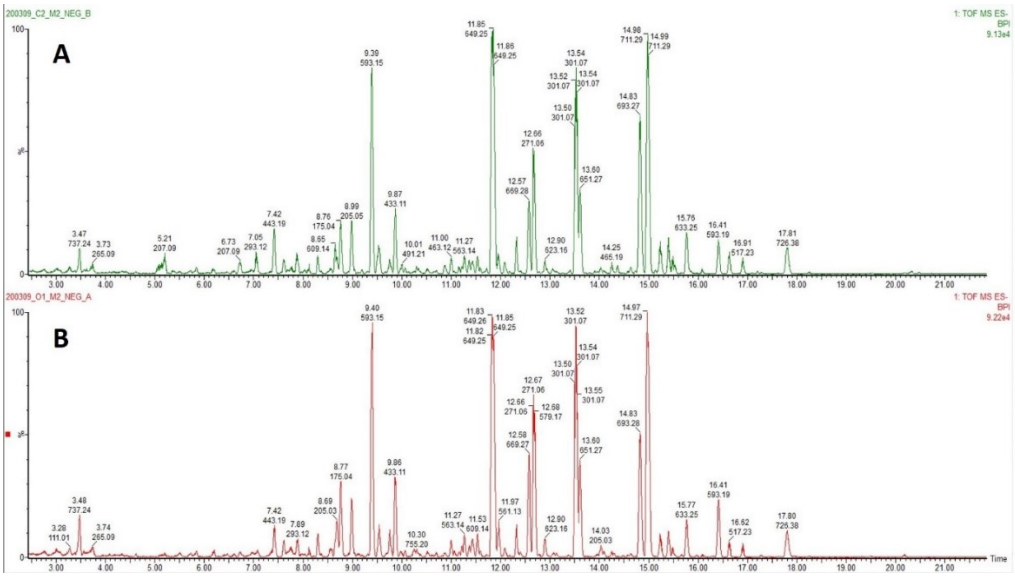


FIG. 1. MS chromatograms (ESI- mode) of organic (A) and conventional (B) orange juice.
Sample extraction: Method 2, Table 1. UPLC conditions: Method C, Table 1; UPLC gradient: 25 min, 1 to 40% solvent B; flow: 0.3 ml/min; column temperature: 40 °C; injection volume: 5 µL; column: ACQUITY UPLC HSS T3 column (100 mm x 2.1 mm, 1.8 µm).

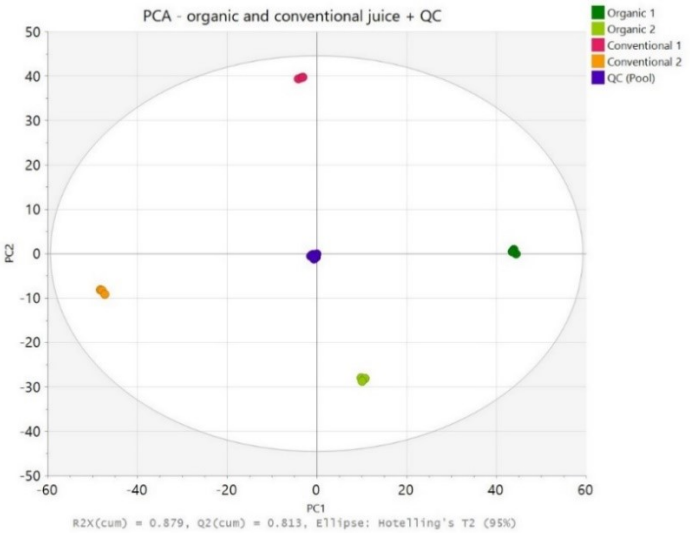


FIG. 2. Principle component analysis (PCA) plot showing the replicates of organic (n=2 x 3), conventional (n=2 x 3) and QC samples (n=15).

A New 'Link' for the Food and Environmental Protection Laboratory

Simon Kelly

The Food and Environmental Protection laboratory (FEPL) has entered into a new collaboration with Thermo Fisher Scientific (Bremen, Germany) that includes the 5-year loan of an EA-IsoLink IRMS system to support the activities in Coordinated Research Project D52042 "Implementation of Nuclear Techniques for Authentication of Foods with High-Value Labelling Claims (INTACT Food)". The EA-IsoLink is specially designed to precisely measure the bulk stable isotope ratios of the light bio-elements hydrogen, carbon, nitrogen, oxygen and sulfur in food, agrarian, geological and other sample types by combustion and high temperature thermochemical conversion coupled to gas isotope ratio mass spectrometry. This capability is an essential resource in FEPL's programme of applied and

adaptive research for Member States that is underpinned by stable isotope and trace element analysis to establish reliable food authenticity and geographical indication control systems.

The EA-IsoLink system is capable of analyzing bulk sample weight in excess of 500 milligrams through the *Flash* elemental analyser, which is fitted with a 124-place automatic sample carousel. The Flash EA can be configured for sequential carbon, nitrogen and sulphur isotope ratio measurements on bulk samples, by Dumas combustion at 1020°C which momentarily rises to 1800°C at the point of sample combustion. In addition, sequential hydrogen and oxygen isotope ratio measurements can be performed on bulk samples, by thermochemical conversion at 1450°C prior to measurement by the *Delta V* isotope ratio mass spectrometer. The EA-IsoLink system can be simultaneously set-up for carbon, nitrogen and sulfur and foroxygen and hydrogen, with the software automatically switching between the analytical configurations. In addition, a new capability in EA-IRMS allows for smaller sample concentrations to be analysed, for example, < 2 µg of carbon, nitrogen and sulfur – this not only opens up the opportunity for lower sample concentrations to be detected, but reduces the total sample weight required for analysis. The EA-IsoLink system will initially be used to analyze a wide range of premium foods produced by developing Member States in the CRP, for example; Taliouine saffron (GI) from Morocco; Chinese Jinxiang Garlic (PGI); Jamaican Blue Mountain Coffee (GI); and Thai Jasmine rice (GI). The EA-IsoLink system can also be used to detect the addition of low cost sugar syrups to adulterate a range of foods, which are prone to addition of exogenous sugars such as fruit juices, honey, maple syrup and palm sugar.

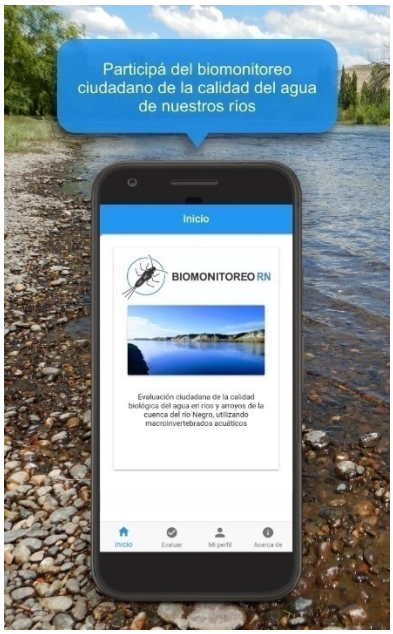
Visiting fellows, trainees and interns will have an opportunity to learn operational and analytical methods on the *EA-IsoLink* instrument, thereby supporting Member State capacity building and raising awareness of the technique. As the supply chains that deliver food stuffs to our doors grow ever more complex, bringing incredible choice to consumers, it becomes more difficult to ensure that we can trust those foods. Stable isotope analysis is a technique which can detect fraudulent or mislabelled premium and protected foods and reduce the risks of unintended food safety incidents associated with adulteration. The new *EA-IsoLink* system also presents the opportunity for collaboration with the other FAO/IAEA Agriculture & Biotechnology Laboratories for research projects that require comprehensive bulk HCNOS stable isotope analysis.

The Thermo Fisher Scientific EA-IsoLink IRMS system. Top right, the Flash Elemental Analyser fitted with liquid and solid autosamplers; top left, The ConFlo IV interface; Bottom, the Delta V Plus gas isotope ratio mass spectrometer.

Biomonitoring of Freshwater Ecosystems: Research and Citizen Participation in the Upper Valley of Río Negro and Neuquén (Patagonia, Argentina)

Pablo Macchi (CITAAC) and Britt Maestroni

Increases in population, along with related economic activities, have increased pressure on freshwater ecosystems in the Upper Valley region (Río Negro and Neuquén, Patagonia) in Argentina. Pesticides, fertilizers, hydrocarbons, plastics, and other pollutants drain into freshwater streams, rivers, wetlands, and ultimately the ocean, causing changes in the water quality, the biota, and ultimately affecting all ecological processes. To make sound decisions for the management of Argentinian fresh water, including planning and active regulation, it is essential to study and understand the relative risks of anthropogenic activities on the aquatic ecosystems. It is necessary to identify the sources and causes of the degradation of natural water habitats, assess their current state and analyze long-term trends in the health of the ecosystem so that Argentinian water bodies are sustainable and continue to provide fresh drinking water for local populations and irrigation water to sustain intensive agricultural production.



App developed to enable involvement of the local population in the protection of water bodies in Argentina.

The Chromatography Laboratory of the Comahue Research Center for Environmental Toxicology and Agrobiotechnology (CITAAC) (National University of Comahue) of Argentina participated in a 5-year FAO/IAEA coordinated research project on integrated analytical approaches to assess the impact of pesticide management practices at a catchment scale (CRP D52035). During the project, CITAAC prepared and validated the physical, chemical and biological methods to test for the integrity of the freshwater system, including the aquatic ecosystems, and was a contributor to the book 'Integrated Analytical Approaches for Pesticide Management' (ISBN: 9780128161555, Eds. B. Maestroni and A. Cannavan) which was compiled by FEPL. The Argentinian laboratory is specialized in the detection of pesticides, hydrocarbons, heavy metals and emerging contaminants using chromatographic and spectrophotometric methods in different matrices, including water, soil and air. For several years the laboratory has also been incorporating biomonitoring activities, based on the analysis of aquatic macroinvertebrates as bioindicators of the effects of agricultural inputs on the ecosystem, to promote an integrated approach to monitoring of freshwater quality and safety. The chromatography laboratory has been a member of the RALACA network of laboratories since 2012 and has headed the RALACA-Biomonitoring Cittee (http://www.red-ralaca.net/activities-committee) since 2014.

In recent years in Argentina, biological criteria based on analyses of aquatic macroinvertebrates have been added to the traditional nuclear and isotopic, physical and chemical monitoring methods to assess the quality of water in the region's aquatic ecosystems.

Between 2014 and 2018 CITAAC conducted field studies in rivers and wetlands in the Negro River basin (Upper Valley), and applied chromatographic techniques for pesticide analysis and biomonitoring to assess the effect of pollutants on the ecosystem. The studies were conducted within the framework of IAEA technical cooperation project RLA7019, 'Developing Indicators to Determine the Effect of Pesticides, Heavy Metals and Emerging Contaminants on Continental Aquatic Ecosystems Important to Agriculture and Agroindustry' (ARCAL CXXXIX) and were supported by the Food and Environmental Protection Laboratory (FEPL) of the Joint FAO-IAEA Division with specific training on analytical methods for pesticide residues testing and nuclear and related techniques to assess sorption coefficients in soil/sediments. Some of the main research results from CITAAC have clearly demonstrated the effects of pesticide contamination (mainly chlorpyrifos) on the richness, diversity, and abundance of macroinvertebrates in freshwater ecosystems. The most notable changes are the decrease in sensitive taxa abundance and the increase in some tolerant taxa associated with maximum concentrations of pesticides.

CITAAC also conducted a comparison between an environmental risk assessment (ERA) and the results from biomonitoring activities. It was shown that both approaches can be complementary for the assessment and prediction of the effects of pesticide contamination, demonstrating the causal relationship between stressors and the responses of macroinvertebrate communities. This line of research is currently being expanded to analysis of the effects of emerging pollutants on macroinvertebrate communities.

The growing concern about the deterioration of aquatic ecosystems in the Upper Valley has led to a requirement for routine monitoring and the development of rapid testing that can be used by local governmental water management agencies. It is also important that citizens are empowered towards sharing a sustainable environment and that all community stakeholders take up the challenge of conserving and managing water quality. With this in mind, CITAAC collaborated with the Institute of Paleobiology and Geology (IIPG) of the National University of Río Negro, Argentina in the development of an application for mobile cell phones, called Biomonitoreo RN. This app allows collective citizen participation in the monitoring of the biological quality of the water of streams and rivers of the Negro river basin, enhancing ownership and emphasizing citizen responsibilities in the sustainable management of the rivers of the Argentinian region. The app enables the user to identify the types of macroinvertebrates present up to the family taxonomic level and calculate the value of a biotic index, which assesses the quality of the water in the monitored section. More information about the app and the participative project can be found (in Spanish) at www.biomonitoreo.com.ar

After six months of implementation of the participative biomonitoring activity, the results indicate that there has been outstanding community participation in biomonitoring, which has allowed the preparation of an environmental map

of water quality, identifying the sections of rivers and streams along the water basin that are most affected by the agricultural inputs.

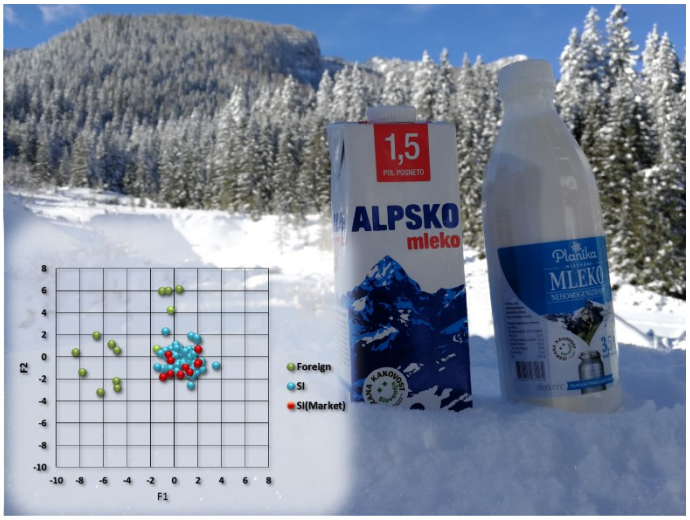
Using the biomonitoring app to provide data on water quality.

The results of the initial period are encouraging and suggest that citizens could play a more active role in environmental monitoring, become more responsible with respect to the preservation of fresh water supplies and help ensure the sustainability of natural resources.

Stable Isotope and Trace Element (SITE) 'Fingerprinting' Used to Independently Verify the "Selected Quality - Slovenia" Mark on Milk Products in Retail Markets

Simon Kelly

The Food and Agriculture Organization of the United Nations and the European Bank for Reconstruction and Development have identified "the promotion of linkages between local producers, their local areas and their food products through geographical indications (as a) recognized pathway to nutritious food systems and sustainable development for rural communities throughout the world… Geographical Indications… are a collective marketing tool that can be used for both the protection and promotion of products". A three-year project carried out by the Slovenian Ministry of Agriculture, Forestry and Food, under the slogan "Our super food" began in 2016. The aim was to promote and to raise awareness about the importance and characteristics of locally produced and processed food. In order to help consumers to easily recognize local quality products, which are grown or produced in Slovenia, the "Selected Quality" national scheme was established and as a result the "Selected Quality - Slovenia" protective mark was created. Most milk and dairy products, produced and processed in Slovenia, now use the "Selected Quality - Slovenia" mark. This is because the Slovenian dairy industry is small and can compete globally only by maintaining the high quality and reputation of their products including milk.



A graphical representation of the discriminant analysis of milk isotopic and element data for origin.

At the same time with the support of the FAO/IAEA Joint Division, through coordinated research project D52038, Professor Nives Ogrinc and her team at the Reactor Centre of the Jozef Stefan Institute, Ljubljana, developed a reference database to independently verify the "Selected Quality - Slovenia" mark for milk using a combination of stable isotope and trace element (SITE) 'fingerprinting' with multivariate statistics. The Slovenian milk SITE database represents an excellent foundation for establishing a sustainable tool with which the origin of milk sold on the Slovenian market can be independently checked. The database was used to conduct surveillance of the origin of retail milk sold in Slovenia. The survey included twenty-five test samples: eleven declared as Slovenian and fourteen from different European countries (Croatia, Hungary, Germany, Austria and Italy). Eight significant variables were identified including oxygen and nitrogen stable isotope ratios and the concentration of macro, micro and trace elements, to best differentiate between Slovenian milk and milk produced elsewhere in the European Union. In this surveillance exercise all of the milk labelled as Slovenian was confirmed as genuine using the nuclear techniques. Further information on this work can be found in a paper recently been published in the journal, 'Food Chemistry'[5].

This technology, developed with the support of the Joint FAO/IAEA Division, is being applied to control Slovenian

5 https://www.sciencedirect.com/science/article/abs/pii/S0308814620308207

milk in a real-world application and has also been used to verify the authenticity of fruit juices on the Slovenian market. Currently, the technology is being transferred to high value foods such as truffles, berry fruits and vegetables to underpin their protection and promotion within the Slovenian "Selected Quality" national scheme.

"Selected Quality Slovenia" mark.

Recent Updates from the Activities of the Analytical Network of Latin America and the Caribbean (RALACA)

Britt Maestroni

The Analytical Network of Latin America and the Caribbean (RALACA) is a non-profit network of laboratories and associated institutions, that aims to improve technical capabilities and encourage cooperation and communication between laboratories in the LAC region. During the COVID-19 pandemic RALACA has continued to support the development and improvement of the necessary capacities to guarantee food safety and a sustainable agricultural environment in the LAC Region by fostering communication and sharing of data and analytical information. In particular, in the period March–April 2020 the RALACA held two webinars, hosted by Britt Maestroni (FEPL), to open additional communication channels for its members, to discuss the current status of RALACA in terms of its legal recognition and to present the results of the regional proficiency testing exercises that took place in 2018 and 2019.

RALACA is in the last step of recognition as a legal foundation with its seat in Panama and is waiting for the official enrolment of the RALACA foundation in the Public Registry in Panama, which was delayed due to current pandemic.

During the webinars it was discussed that it is critical that the laboratories continue to demonstrate competence for testing, and therefore RALACA will support the further implementation of proficiency testing in the LAC region: a new round is expected to take place in the last quarter of 2020, provided the laboratories resume work considering the current circumstances.

A new RALACA committee on risk assessment was created in 2019 and an additional one will be formed in 2020 to work on data sharing issues. The latter will include members from LAC laboratories participating in IAEA TCP RLA5080.

The RALACA board announced that the management of the RALACA web page has transitioned from Chile to Costa Rica. RALACA is enormously grateful to Mr Patricio Henriquez Pizarro and the Comision Chilena Energia Nuclear (CCHEN), Chile, for their continuous support to the web management of RALACA. The task is currently being handed over to Centro de Investigacion y Contaminacion Ambiental (CICA) in Costa Rica. The FEPL will be providing additional help in this transition by supporting with an expert mission to provide the framework for an information repository of analytical data that will support further data mining and risk assessment at regional level and with a long term goal of a rapid alert system that can be helpful in emergency situations like the current pandemic.

The RALACA has just recently published the newsletter number 3/4 where recent A activities are summarized, for example the RALACA global women breakfast that was celebrated on the 12th of February with the support of the International Union of Pure and Applied Chemistry (IUPAC).

The RALACA board would like to encourage the active participation of all RALACA Institutions in the work of the different committees and invite all Institutions to host online presentations of their own activities and infrastructure. Please contact the RALACA board for further information[6].

The RALACA Global Women Breakfast in Costa Rica.

The RALACA Global Women Breakfast in Uruguay.

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Is It Organic? The Highlights of a Short Home-Based Feasibility Study with the SCiO "Pocket Molecular Sensor" to Distinguish between Organic and Conventional Tomato Fruits

Marivil Islam and Simon Kelly

The Food and Environmental Protection Laboratory facility has been closed until recently in order to comply with the lock-down requirements brought about by the COVID-19 pandemic. The usual laboratory-based activities have been temporarily replaced with project coordination, report and scientific manuscript writing; on-line meetings, and making inventories and preparations for the transfer of staff and equipment to the new Yukiya Amano Building laboratories. Nevertheless, this unprecedented situation has also provided an opportunity for FEPL staff to utilize some of the hand-held and field deployable equipment and techniques that have been utilized in the Coordinated Research Project "Field-deployable analytical methods to assess the authenticity, safety and quality of food" for point of contact (POC) use by member states. One such technique used in the horticultural industry is near infrared (NIR) spectroscopy, where it is deployed as a non-destructive POC screening tool to provide quality prediction of fresh and stored products. It is used routinely for the compositional, functional and sensory analysis of food ingredients, process intermediates and final products. This is achieved by measuring the spectral properties of crops when irradiated with electromagnetic radiation between 780–2500 nm or 12,820– 4000 cm^{-1} wavenumbers.

FEPL staff undertook a short home-based feasibility study, during the lock-down period, to investigate the use of the low-cost (~ $300) SCiO™ "pocket molecular sensor" for its ability to provide the user with organic tomato authenticity information. NIR spectroscopy has potential as a accessible complementary screening tool prior to analysis by more advanced nuclear techniques, such as nitrogen stable isotope analysis, to confirm the authenticity of specific aspects of organic cultivation, such as the use of animal manures rather than synthetic nitrate fertilizers. Tomatoes were chosen for this study as they have a global production of over 182 million metric tons and were recorded in 2018 by the FAO as the most commonly produced vegetable crop in the world. Whilst organic crops are subject to all the usual safety and quality checks there are no officially recognized end-product tests to verify organic labelling claims. This is a major gap in the quality control of organic produce as economic incentives to fraudulently mislabel conventionally cultivated crops as organic remain very high, with price differentials ranging up to 300% for some specific types e.g. tea and coffee. This had led to some significant fraud cases running over several years and into many millions of Euros. For example, in the EU operation OPSON VIII in 2019, 24 tons of organic food products were seized, and 162 tons were downgraded to conventional status. This operation led to 19 criminal investigations and 105 administrative procedures and the subsequent investigation and/or arrest of 20 individuals.

In this home-based study the SCiO device was used to acquire the spectral data of intact tomato fruit samples in the wavelength range of 740–1070 nm or 13,514–9346 cm^{-1} with a sampling interval of 1 nm. The "SCiO™ Lab" online cloud-based application was used for data collection/storage and statistical analysis of the spectra on a tablet and desktop PC, respectively. The prediction of the tomato quality attributes was based on an overall state of the fruit captured by the sensor, which can be indicative of various physical and chemical properties such as skin colour, stage of ripening, surface scattering characteristics and near surface sugar content. While they may look the same, organic and conventional tomatoes are not grown the same way. Organic growers must follow organic standards as specified in that particular country. Organic tomatoes are potentially more nutritious than conventionally grown tomatoes. Organically grown tomatoes may also contain more Vitamin C and more phenolic content, as natural protective compounds, compared to chemically fertilized, synthetic pesticide protected tomatoes. Polyphenols are produced as tomatoes ripen, and the amount of polyphenols tomatoes produce can be affected by growing conditions. It is also possible that because organic tomatoes ripen for longer, in less nitrogen-rich soil, they may contain higher levels of polyphenols.

For the purposes of this short home-based feasibility study nine samples of conventional and six samples of organic labeled-tomato fruits were purchased from different retail outlets and their spectral and quality measurements obtained in order to develop NIR predictive statistical models. In addition, another five unique (three conventional and two organic) retail samples were purchased on different days and analyzed as 'challenge' samples for external validation of the predictive statistical models. The performance of the SCiO™ sensor for quality prediction was assessed by developing classification models using the SCiO™ Lab online application assuming that the tomatoes were authentic examples of their target-class i.e genuine as labelled. Four randomly selected tomato fruits were measured from each packet and each tomato was scanned three times in different positions approximately 120° apart around the circumference of the fruit as shown in Figure 1. This measurement approach produced a total of 60 measured samples and 180 scans.

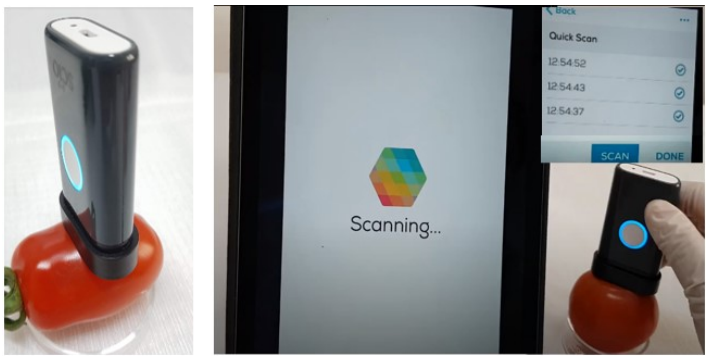


FIG. 1. Near Infrared (NIR) hand-held microspectrometer collecting spectra from a tomato sample and scanning using the "SCiO™ Lab" Web application.

Various spectral data pretreatments were investigated using the "SCiO Lab" web-based application and the best performing principal component analysis (PCA) statistical model produced correct classification rates of 92% for organic tomatoes and 96% conventional tomatoes (see Figure 2). To further challenge the models with a 'new population', another test collection was created to measure the additional set of tomatoes, bought from the market on different day, as new anonymized samples. The selected model was chosen to test the specific challenge collection. The model predicted 92% of the organic tomatoes correctly and 72% of the conventional tomatoes correctly, based on the tomato labelling information provided.

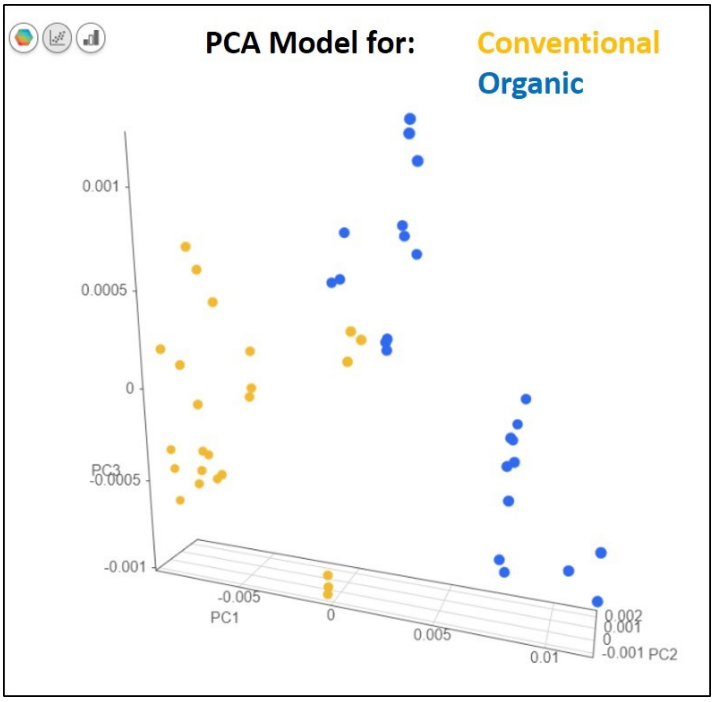


FIG. 2. Principle component analysis (PCA) plot showing the first two principle components of the multivariate model developed from the NIR spectra (740–1070 nm) of conventional tomatoes (yellow dots) and organic tomatoes (blue dots).

This feasibility study, completed by FEPL staff during the lockdown period, has successfully demonstrated the potential of using a low-cost handheld NIR device for POC use, to test market samples, in any environment including our developing member states. In combination with on-line statistical tools, it was possible to successfully distinguish organic tomatoes from conventional ones with varying degrees of success in home-based experiments. This preliminary study was able to show that given time to collect and measure organic and conventional tomatoes of confirmed provenance, it should be possible to develop a database permitting more accurate, reliable and robust models for routine testing and that could include other 'consumer preference' attributes such as the sweetness or ripeness, etc. of the samples. The SCiO lab data processing option offers the potential for immediate POC food authenticity, quality or safety testing in real time.

Nuclear Techniques Help to Uncover Food Fraud in the Mānuka Honey Industry in Landmark Case in New Zealand

Simon Kelly and Aiman Abrahim

Mānuka honey is a high-value food commodity prized for its antimicrobial properties and is widely regarded as a "super food" with purported health benefits. Consequently, it fetches a high price on global food markets and can reach as much as €500 per kilo for examples containing high concentrations of the active ingredient methylglyoxal (MGO). MGO and its precursor dihydroxyacetone (DHA) are transferred from the mānuka bush whilst bees are collecting the plants nectar to make honey.

Picture of manuka honey and manuka flower courtesy of Family Health New Zealand.

In 2016, the New Zealand Ministry of Primary Industries (MPI) started to investigate a former Auckland honey exporter who was suspected of intentionally adding a synthetic chemical version of the active ingredient MGO and its precursor DHA to low-grade and non-mānuka honeys in order to artificially increase the value of the honey and subvert the established chemical and antimicrobial tests to assess its activity and quality. Nuclear techniques, such as stable isotope analysis, are very good at differentiating between natural and synthetic versions of high value ingredients used in the flavour and fragrance industries e.g. vanilla. In this case of mānuka honey fraud, stable carbon and hydrogen isotope analysis was applied to demonstrate

that the active ingredient MGO, extracted from the honey using a derivative developed at the FAO/IAEA Joint Division's Food and Environmental Protection Laboratory, was synthetic. The nuclear technique clearly showed the difference between naturally derived MGO from the mānuka bush and that obtained from industrial chemical synthesis. The combined investigative and analytical evidence led to the culprit pleading guilty to the charges and fines totalling $372,500 being brought against the company's operations manager in this landmark case involving deliberate food adulteration. The MPI estimated that around 14.5 tonnes of counterfeit manuka honey were produced resulting in a recall of all affected honey including honey exported to USA, China/Hong Kong, Korea, Australia, and Singapore. It was estimated the company made illegal gains of approximately $700,000 through its food fraud activities.

Flowering mānuka bush at Silver Peaks, Dunedin, Otago, New Zealand (Tomas Sobek, Flikr).

Optimization of a Multiresidue Method for the Detection of Pesticide Residues in Orange Juice

Britt Maestroni and Sofia Rezende

In conventional agriculture, to maintain high yields and quality in the production of fruits, a wide variety of pesticides are applied to the crops. Frequently, after harvest, pesticides can remain on the crops as residues. It is the role of the analytical testing laboratories within regulatory control systems to detect those residues and provide evidence of compliance of residue levels with maximum residue limits (MRLs) as established by national and international regulations. Accurate, reliable, cheap, rapid, robust and selective multiresidue analytical methodologies must be optimized and validated at the laboratory to ensure that the measurements can be implemented at trace levels and that unequivocal evidence is available to confirm the identity and quantity any pesticide residue detected. Chromatographic techniques coupled to mass spectrometric detection are well suited for this purpose.

Based on Member State needs, the FEPL initiated a study on the optimization of a multiresidue method for the detection of pesticide residues in orange juice using liquid chromatography and gas chromatography coupled to tandem mass spectrometry (LC-MS/MS and GC-MS/MS). The Swedish ethyl acetate sample preparation method (SweET method) was chosen for its simplicity, speed, and the selectivity afforded by the low solubility of sugars and proteins in ethyl acetate (EtOAc). Ethyl acetate extracts can be directly injected into the GC system, but typically cause solvent effects such as peak splitting when injected on LC systems using reversed-phase aqueous buffers and methanol mobile phases. To avoid an additional evaporation and redissolution step a gradient elution profile proposed by the National Food Agency of Sweden was adopted, allowing direct injection of ethyl acetate extracts as shown in Fig. 1.

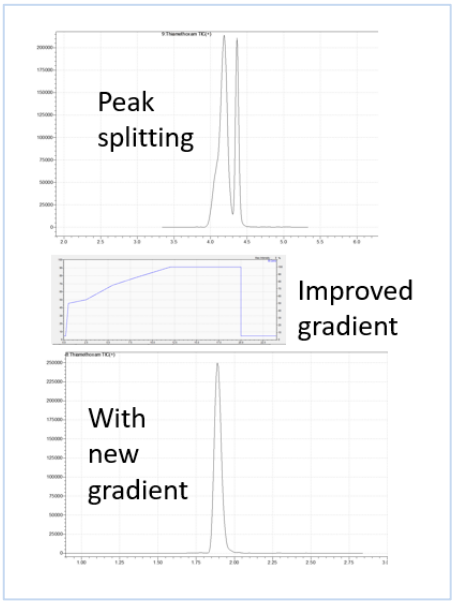


FIG.1. The solvent effect for the pesticide Thiametoxam by LC-MS/MS. Peak splitting disappears after the implementation of the new gradient.

Optimization of the instrumental detection systems (LC-MS/MS and GC-MS/MS) included establishment of the multiple reaction monitoring (MRM) transitions and respective collision energies, using the information from the pesticide database from Shimadzu (LC0MS/MS) and Agilent Technologies (GC-MS/MS) respectively, for each evaluated compound. Both instruments were operated in scheduled MRM mode to increase sensitivity and selectivity.

The next step was the optimization of the sample preparation. Spiking experiments were conducted as outlined in Figure 2 investigate the need for an additional clean up step using primary-secondary-ammine (PSA) and C18. Matrix matched calibration standards were also prepared for each scheme. 71 pesticides were optimized for GC-MS/MS analysis and 55 pesticides for LC-MS/MS analysis. The results of the experiments are summarized in Figures 3A and 3B for the GC-MS/MS and LC-MS/MS. Since the additional clean-up step provided very little or no advantage, it was decided to keep the sample preparation as simple as possible to avoid additional uncertainty sources from additional analytical steps. The validation of the method according to Codex guidelines is ongoing.

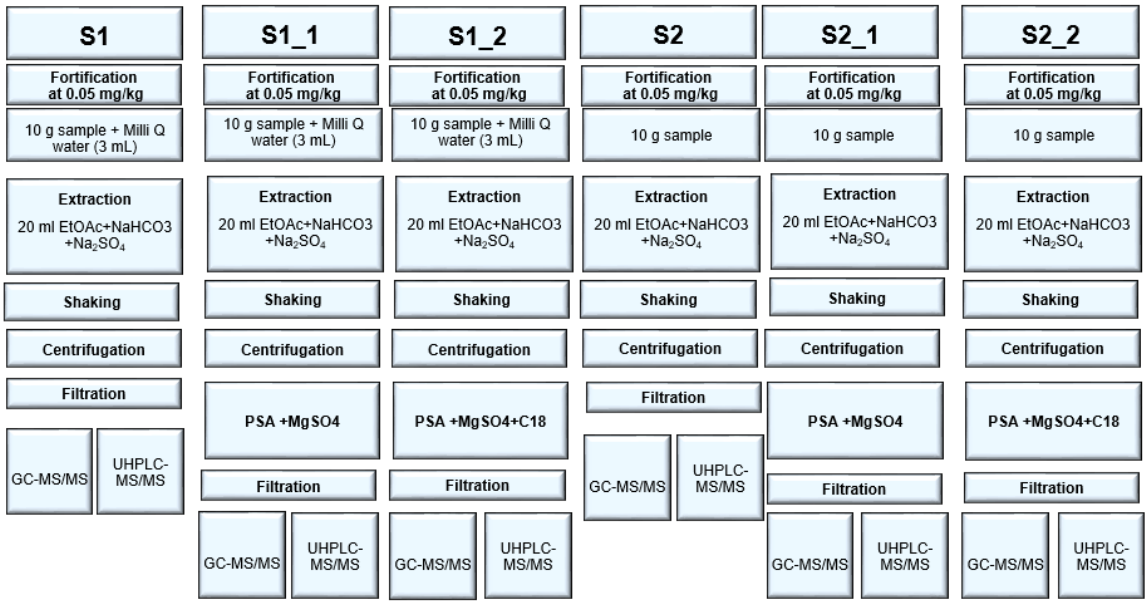


FIG. 2. Experiments setup for orange juice method optimization.

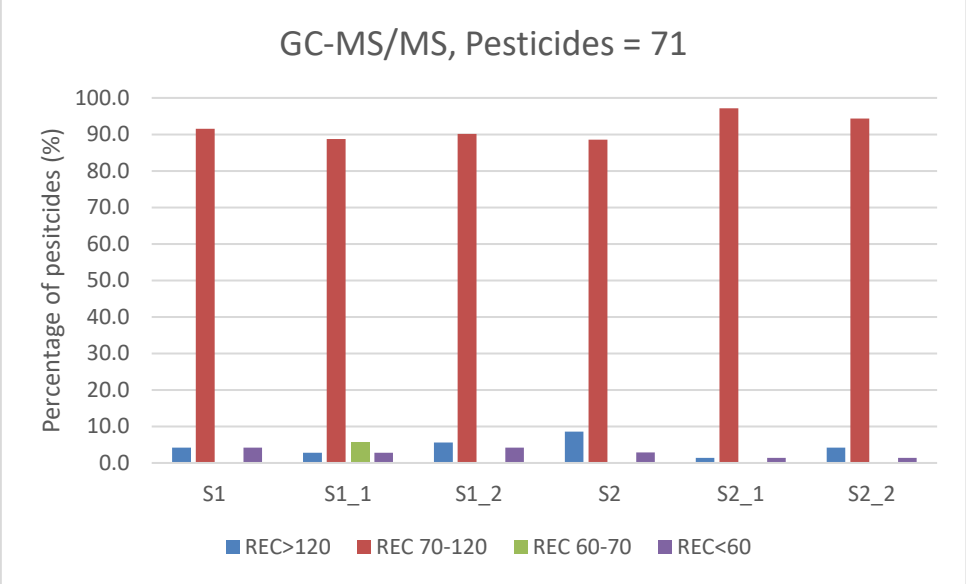


FIG. 3A. Percentage of pesticides recovered (REC) by the GC-MS/MS method.

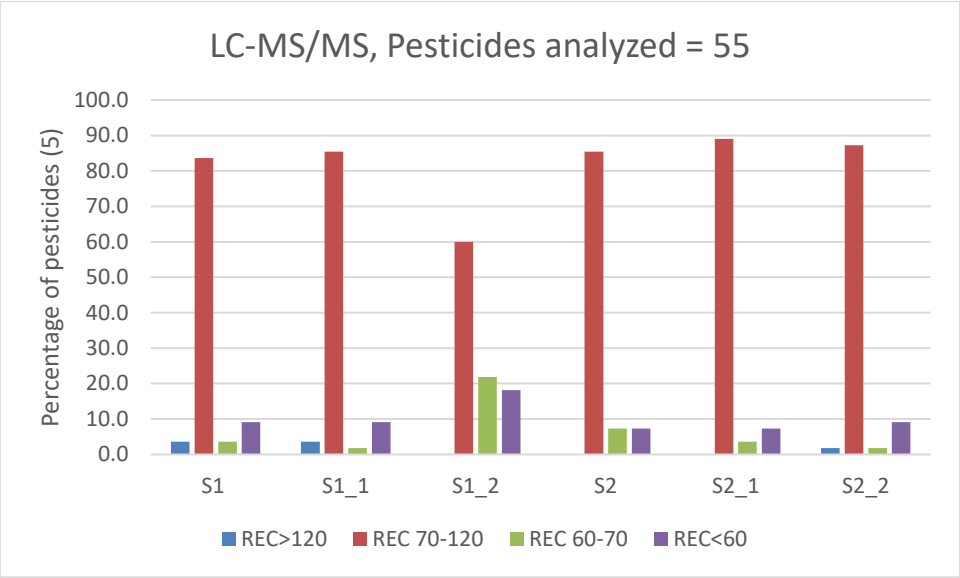


FIG. 3B. Percentage of pesticides recovered (REC) by the LC-MS/MS method.

FEPL Staff

Ms Ying Liang, from the Institute of Food Safety and Nutrition, Jiangsu Academy of Agricultural Science in China, completed a one-year assignment in FEPL as a cost-free expert in June 2020. Ying contributed to various areas of FEPL's work, including the preparation of stock standards, dilutions and mixtures for use in analytical method development, optimization of the extraction, clean-up steps and validation of methods for residues and contaminant analysis in turmeric and in honey by LC-MSMS, and method development for the detection of adulteration of argan oil and palm oil using gas-chromatography-ion mobility spectroscopy. Ying also drafted several standard operating procedures for future use in FEPL and in Member State laboratories. We thank Ying for her contributions to FEPL outputs over the past year and wish her all the best for her future work upon her return to her home institute.

Ms Maria Sofia Rezende, from the University of the Republic, Uruguay, joined FEPL in January 2020 for a one-year PhD consultancy. Sofia will contribute to FEPL outputs mainly in the field of analytical methods for the control of chemical contaminants and residues in food and will provide support to the FEPL staff in the training of fellows and other capacity building activities targeting RALACA Member Countries, especially in activities that require the Spanish language.

Due to an internal reorganization necessitated by the imminent relocation of the Food and Environmental Protection Laboratory, the Animal Production and Health Laboratory and the Soil and Water Management and Crop Nutrition Laboratory to the new Yukiya Amano Laboratory building, Ms Caroline Wafula, who joined FEPL as a Team Assistant in February 2019, changed positions to provide support to the Plant Breeding and Genetics Laboratory in May 2020. We thank Caroline for the excellent support she provided for FEPL staff and activities over the past 16 months and wish her well with her new colleagues. FEPL welcomes Ms Joanna Mletzko, who will now provide administrative support to FEPL as well as the other two laboratories moving to the Yukiya Amano building.

FEPL Fellows

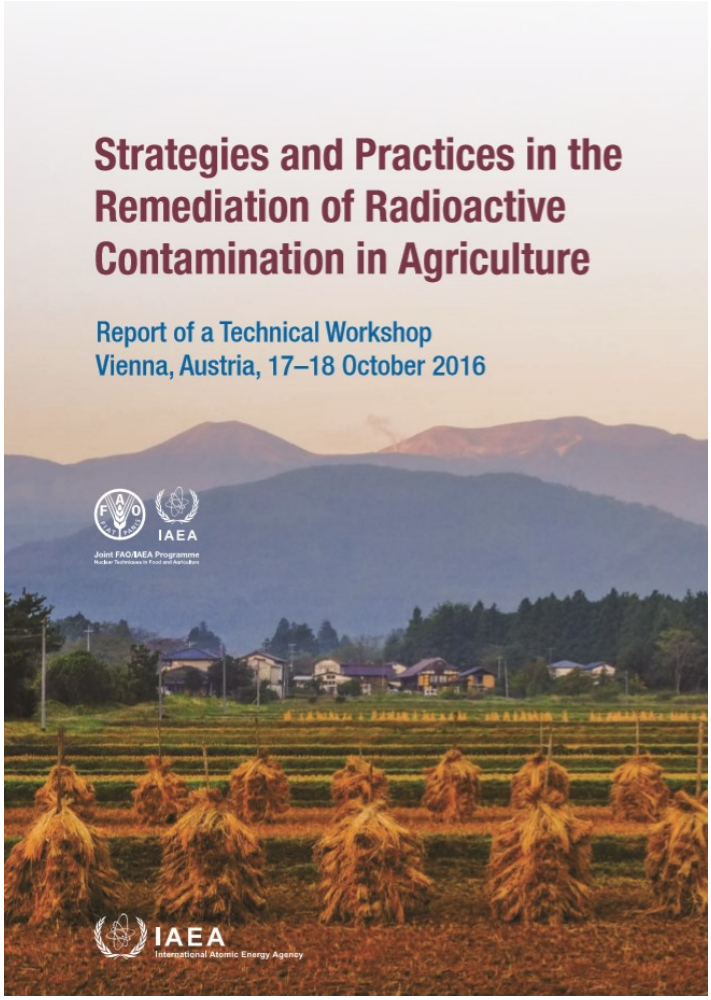
Mr Kasun Madusanka Binduhewa, from the Sri Lanka Atomic Energy Board, commenced fellowship training in FEPL on the use of isotope ratio mass spectrometry and multi-variate statistical tools under TCP SRL5048, 'Strengthening National Capability for Food and Feed Safety' at the start of March 2020. The fellowship was planned for one month, but was, unfortunately, cut short after two weeks due to the impending travel restrictions and quarantine requirements imposed as a consequence of the COVID-19 pandemic. Nevertheless, Kasun proved to be a diligent and enthusiastic trainee who managed to assimilate a lot of knowledge during his short time in FEPL, and he remains in contact with FEPL staff for further advice and guidance.

Announcement

PC8353: Strategies and Practices in the Remediation of Radioactive Contamination in Agriculture, Proceedings Series

Scientific Secretaries: Z. Ye, C. Blackburn, G. Dercon, I. Naletoski, S. Nielen, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

This publication presents the proceedings of a workshop on the remediation of radioactive contamination in agriculture. The workshop brought together specialists from different countries and technical backgrounds and sought to disseminate research findings and encourage future studies aimed at the development of technologies to support sustainable agricultural production and rural development after a nuclear accident. The presentations and discussions at the meeting focused on both laboratory findings and practical field-work experience in planning and implementing remediation activities. The participants provided information related to agricultural production in Japan after the Fukushima Daiichi accident and in the many different countries affected by the Chernobyl accident. The workshop contributed to the dissemination of information and knowledge in this very distinct area and produced conclusions, recommendations and observations to enhance preparedness and response planning for nuclear emergencies and radiological incidents in relation to food and agriculture. This publication is targeted at authorities responsible for food and agriculture, international organizations working in this area, as well as professionals and academics involved in the remediation of radioactive contamination. It will also be of interest to nuclear safety or emergency planning and response specialist.



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