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Nuclear Techniques in Food and Agriculture

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To the Reader

The Food and Environmental Protection Section (Vienna) and the Agrochemicals Unit of the Agriculture and Biotechnology Laboratory (Seibersdorf) implement the Joint FAO/IAEA subprogramme on improving food and environmental safety. The subprogramme provides assistance in four main areas, namely, coordinating and supporting research, providing technical and advisory services, providing laboratory support and training and collecting, analyzing and disseminating information, primarily in areas related to the use of ionizing radiation, pesticide and veterinary drug residues and radioactive contamination of foodstuffs.

Many of the subprogramme activities are undertaken in collaboration with other international bodies such as the Joint FAO/WHO Codex Alimentarius Commission and the International Plant Protection Convention (IPPC). A primary objective for the subprogramme is to improve the application of the revised international standards for post-harvest applications of food irradiation, including the operation of irradiation facilities, in both FAO and IAEA Member States. These efforts result in enhanced food quality and safety, the protection of consumer health and the facilitation of international trade in foodstuffs.

An example of these collaborative efforts is our assistance in the development of international standards for the control of post harvest pests of economic and/or quarantine importance through the IPPC Technical Panel on Phytosanitary Treatments (TPPT) under the IPPC. Among other ongoing activities, the subprogramme hosted the IPPC TPPT in December 2006, which resulted in the further elaboration of the

revised ISPM No. 18, Guidelines for the Use of Irradiation as a Phytosanitary Measure. The FAO/IAEA is also hosting the IPPC Technical Panel on Fruit Flies, including their latest meeting held in Vienna from 1 to 5 September 2008.

Other collaborative activities include our recent participation and presentation of a manuscript (see Feature Article) on the Current State of the Application of Irradiation Technology with Emphasis on Post-Harvest Phytosanitary Treatments at the International Level at a Symposium on Irradiation as a Post-Harvest Phytosanitary Treatment held during the 32nd Annual Meeting of the North American Plant Protection Organization (NAPPO) in Guadalajara, Mexico from 20 to 24 October 2008.

Our presentation to the NAPPO meeting included a report on our newly updated and revised Food Irradiation Clearances database, which is a compilation of information on country approvals of irradiated foods for human consumption. The information includes country name, class of food, specific food product, objective of irradiation, date of approval and recommended dose limit.

A valuable addition to this Food Irradiation Clearances database is our newly published Food Irradiation Facilities database, which is a compilation of information on facilities for the irradiation of foods intended for human consumption. The information includes country name, facility contact details, type of irradiator and energy source.

Both databases, which are maintained by the Food and Environmental Protection Subprogramme, are available on the IAEA Nucleus Portal[1]. NUCLEUS is the common access point to IAEA scientific, technical and regulatory information resources. It incorporates and facilitates access to more than 100 IAEA databases, scientific and technical publications, as well as safety standards.

The subprogramme is also committed to developing a new Coordinated Research Project over the next five years on the Development of Generic Irradiation Doses for Quarantine Treatments. A consultants meeting to develop this CRP proposal took place in Vienna from 3 to 7 November 2008 in close collaboration with the FAO/IAEA Insect Pest Control subprogramme (see New Coordinated Research Projects section).

The expanded development of irradiation technology will be further enhanced through strengthened international cooperation between the FAO/IAEA and Member States via the dissemination of information on the benefits of irradiation as a post harvest treatment technology.

Our training activities include a forthcoming regional training workshop on the Application of International Standards related to Irradiation for Sanitary and Phytosanitary Purposes that is being organised by the IAEA and the Philippines Nuclear Research Institute in Manila from 8 to 12 December 2008 for participants from the Asia and Pacific region. Under the regional TC project RAS/5046 on Novel Applications of Food Irradiation Technology for Improving Socioeconomic Development, we will also be holding an IAEA Regional Training Course on the Use of Irradiation as a Phytosanitary Application for Economically Important Fruits in Beijing, China from 23 to 27 February 2009.

The Joint Division looks forward to its continuing collaboration with both FAO and IAEA Member States in facilitating trans-boundary agricultural trade by providing technical support for the development and harmonization of international sanitary and phytosanitary standards and to facilitate access to international markets and foreign exchange.

In closing, we all wish to convey our heartiest congratulations to Mariana Schweikert-Turcu, who has worked in the Agrochemicals Unit at Seibersdorf since 2002, in undertaking her new position with the Chemical Analysis Unit at the Seibersdorf Safeguards Analytical Laboratory.

Best wishes to you and your families for a happy, healthy and prosperous New Year.

Sincerely,

David H. Byron

[1] http://nucleus.iaea.org/NUCLEUS/nucleus/Content/index.jsp

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Feature Article

Current State of the Application of Irradiation Technology with Emphasis on Post-Harvest Phytosanitary Treatments at the International Level[2]

Technical Officers: David H. Byron and Gary James Luckman

Abstract

Since 1964, the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture has been promoting the mandates of the Food and Agricultural Organization of the United Nations (FAO) in its efforts to eliminate world hunger and poverty through sustainable agricultural development, improved nutrition and food security and that of the International Atomic Energy Agency (IAEA) through its peaceful uses of atomic energy to accelerate and expand the contribution of nuclear technologies to health and prosperity worldwide. Food irradiation is one of the few technologies which address both food quality and safety by virtue of its ability to control spoilage and food-borne pathogenic micro-organisms and insect pests without significantly affecting sensory or other organoleptic attributes of the commodity.

Introduction

The mission of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture is to strengthen capacities for the use of nuclear techniques for sustainable food security and to disseminate these technologies through international activities in research, training and outreach in its Member States. The Joint FAO/IAEA Programme is subdivided into four major subprogrammes on sustainable intensification of crop production systems, sustainable intensification of livestock production systems, sustainable control of major insect pests and improving food and environmental safety.

The Food and Environmental Protection Section (Vienna) and the Agrochemicals Unit of the Agriculture and Biotechnology Laboratory (Seibersdorf) implement the Joint FAO/IAEA Subprogramme on improving food and environmental safety. The subprogramme provides assistance in four main areas, namely, coordinating and supporting research, providing technical and advisory services, providing laboratory support and training and collecting, analyzing and disseminating information, primarily in areas related to the use of ionizing radiation, pesticide and veterinary drug residues and radioactive contamination of foodstuffs.

Many of the subprogramme activities are undertaken in collaboration with other international bodies such as the Joint FAO/WHO Codex Alimentarius Commission and the International Plant Protection Convention. A primary objective for the subprogramme is to improve the application of the revised international standards for post-harvest applications of food irradiation, including the operation of irradiation facilities, in both FAO and IAEA Member States. These efforts result in enhanced food quality and safety, the protection of consumer health and the facilitation of international trade in foodstuffs.

Countries Applying Food Irradiation Technology

Food irradiation is approved for use in over 55 countries worldwide for various applications and purposes in a wide variety of foodstuffs; however, its use as a post-harvest phytosanitary treatment is still limited. Examples of countries with legislation allowing phytosanitary uses of irradiation include Argentina, Australia, Bangladesh, Brazil, China, India, Israel, Mexico, Philippines, Russian Federation, Thailand, Turkey, Ukraine, the United States of America, and Vietnam.

Recent updates in national legislation have facilitated the use of irradiation as a post-harvest phytosanitary treatment. Shipments of irradiated mango from India to the USA started in 2007 with more than 160 tons and with 2000 tons planned during 2008. In addition, small quantities of irradiated papaya were shipped from Australia to New Zealand in 2008 in addition to ongoing shipments (300 tons) of Australian mangos, which commenced in late 2004. Australia is also hoping to commence shipping irradiated longan and litchi to New Zealand during 2009.

Following the signing of a Bilateral Equivalency Agreement in 2007, Mexico is expected to begin the first shipments of irradiated fruit (tangerines, grapefruit, guava and mango) to the US market during the 2008-2009 season.

Thailand is also expected to ship irradiated mangosteen to the USA, and eventually litchi, longan, mango, mangosteen, pineapple and rambutan, following the successful certification of a Thailand gamma radiation facility by the US Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS).

Other countries such as Chile, Colombia, Ghana, Guatemala, Indonesia, Jamaica, Egypt, Libyan Arab Jamahiriya, Malaysia, Mongolia, Morocco, Nigeria, Peru, Sri Lanka, Syrian Arab Republic, and Uruguay are working with the IAEA on assessing the feasibility of using irradiation as a

[2] Presented at a Symposium on Irradiation as a Post-Harvest Phytosanitary Treatment held during the 32nd Annual Meeting of the North American Plant Protection Organization (NAPPO) in Guadalajara, Mexico from 20 to 24 October 2008

post-harvest phytosanitary treatment alternative to the use of other quarantine treatments.

Agricultural Products Treated at the Commercial Level for Sanitary and Phytosanitary Purposes

The US Food and Drug Administration recently (August 2008) approved the use of irradiation to control food-borne pathogens in iceberg lettuce and spinach, in addition to existing USA approvals for a variety of products, including herbs and spices, grains, poultry, ground beef, and seafood.

Other countries continue to irradiate significant volumes of foods for sanitary purposes, including China (spices, seafood, vegetables), France (spices), Germany (spices), India (spices, seafood), Indonesia (spices, grains, seafood), Japan (potato), Republic of Korea (spices, vegetables, sterilized meals), Malaysia (spices), Thailand (grains, spices, meats), United Kingdom (spices, specially prepared meals) and Vietnam (spices, seafoods).

Volumes of Irradiated Produce Treated (Source IAEA 2006) include:

Country	Volume	Commodity
China	140,000 tons	Spices, garlic, grains, dry vegetables
USA	100,000 tons	Spices, meats (beef and poultry), vegetables
Japan	20,000 tons	Potato
Vietnam	15,000 tons	Spices, seafood, frog legs, seasoning
Indonesia	6,000 tons	Cocoa powder, frozen foods, spices, dry vegetables, honey powder
Republic of Korea	3,500 tons	Spices and dry vegetables
Thailand	3,000 tons	Spices, herbs, pork sausages, seafood, frog legs
India	2,000 tons	Spices, dry vegetables, cereals and pulses

FAO/IAEA Technical Assistance Projects Related to Food Irradiation

The long term goals of the IAEA include the strengthening of the national capacities of FAO/IAEA Member States in applying irradiation as a phytosanitary treatment to control insect pests in exported fruits and vegetables, and in sanitary applications for the control of bacterial contamination and the extension of shelf-life in foods.

Several FAO/IAEA technical cooperation projects undertaken in collaboration with the IAEA Technical Cooperation Department (TC) since 2005 are now being finalised, including:

Brazil	Applying Ionizing Radiation for Food Security and Health Care
Bangladesh	Phytosanitary Treatment for Insect Pests Infesting Fresh Fruits
China	Strengthening the Quality Assurance System for Food Irradiation
Guatemala	Establishing a Food Irradiation Plant
Morocco	Industrial Application of Irradiation
Philippines	Upgrading the Gamma Irradiation Facility

Other FAO/IAEA and TC projects dealing with food irradiation with the following countries/and or regions have been active since 2007, including:

Argentina	The Use of Ionizing Radiation for the Phytosanitary Treatment of Fresh Fruit
Colombia	Cost-Benefit Assessment for the Modernization of an Irradiator
Morocco	Conserving and Improving the Quality of Aromatic and Medicinal Plants
Nigeria	Feasibility Study on the Optimal use of an Industrial Gamma Irradiation Facility
Sri Lanka	Establishment and Operation of a Multi-Purpose Gamma Irradiation Facility
Asia/Pacific	Novel Applications of Food Irradiation Technology for Improving Social Economic Development

New proposed FAO/IAEA and TC projects that are awaiting IAEA approval and are expected to commence in the following countries and/or regions in 2009 include:

Israel	Supporting a Feasibility Study for using Irradiation as a Quarantine Treatment
Jamaica	Supporting the Food Irradiation of Selected Economically Important Crops
Uruguay	Preparing for the Introduction of Irradiation Techniques
Asia/Pacific	Enhancing Sanitary and Phytosanitary Treatment of Regional Products for Export

Regional Training Activities in the Application of Food Irradiation

The subprogramme organised a very successful regional workshop in the Americas on irradiation in October 2007.

The workshop was held in Mexico and was attended by 70 participants from 21 regional countries, including senior officials responsible for regulations in the area of phytosanitary measures for foods, quarantine officials, exporters, importers and professionals working in related areas.

The principle objective for the workshop was to enhance knowledge and provide up to date information on the use of irradiation as a quarantine phytosanitary treatment as well as to discuss potential future activities. The workshop recommendations recognised the urgent need for specific training at the regional and national level in the development of radiation technology as a quarantine phytosanitary treatment.

The workshop participants requested that the IAEA technically and financially support future training activities in conjunction with FAO and other regional plant protection organizations. A follow up meeting between the FAO/IAEA and Mexico was held to determine the possibility of establishing a regional training centre in Mexico, which could assist regional countries in introducing irradiation technology as a quarantine treatment. Further work on this initiative is being planned.

A follow up FAO/IAEA regional training workshop on the operational requirements for irradiation treatments used for quarantine purposes is now planned for Latin America during the second quarter 2009, most likely in collaboration with the IAEA Department of Technical Cooperation.

Another regional training workshop on the Application of International Standards related to Irradiation for Sanitary and Phytosanitary Purposes is being organised by the IAEA and the Philippines Nuclear Research Institute in Manila from 8 to 12 December 2008 for participants from the Asia and Pacific region.

IAEA Coordinated Research Project (CRP) Activities

The International Atomic Energy Agency (IAEA) encourages and assists the development and practical application of research on peaceful uses of atomic energy throughout the world so as to foster the exchange of scientific and technical information. IAEA coordinated research activities are designed to stimulate and coordinate the undertaking of research by scientists in IAEA Member States in selected nuclear fields. These coordinated research activities are normally implemented through Coordinated Research Projects (CRP) that join together research institutes in both developing and developed Member States to collaborate on the research topic of interest. The research that is supported encourages the acquisition and dissemination of new knowledge and technology generated through the use of nuclear technologies and isotopic techniques in the various fields of work covered by the IAEA mandate.

Previously concluded coordinated research projects have included the FAO/IAEA Coordinated Research Project (2001-2005) on the 'Use of Irradiation to Improve the Hygienic Quality of Fresh, Pre-cut Fruits and Vegetables', which addressed current scientific gaps in the area, including the efficacy of irradiation to ensure microbiologically safe fruits and vegetables at levels that maintained the sensory attributes of the foods.

We also anticipate the non-serial in-house publication of the research results of a recently concluded CRP on the 'Use of Irradiation to Ensure the Safety and Quality of Prepared Meals'. This CRP evaluated the effectiveness of irradiation as a method to ensure the microbiological safety and extend the shelf-life of prepared meals, stored under ambient, chilled or frozen conditions, and to evaluate the sensory quality of the treated products.

Another CRP completed in 2002 concerned 'Irradiation as a Phytosanitary Treatment of Food and Agricultural Commodities'. The results provided valuable data on the effect of low doses of irradiation at different stages of development of almost 30 different species of insects and mite, which represented major trade problems. It is important to note that some of the projects resulted in the first approvals against a non-fruit fly pest (sweet potato weevil and mango seed weevil).

This CRP outputs also included information on the tolerances of foodstuffs and packaging materials to irradiation treatments, methodologies used and the efficacy of combined treatments. This CRP included a number of 'firsts', such as the implementation of large-scale confirmatory tests for several non-fruit fly pests, the first commercial shipment of cut flowers using irradiation as part of a quarantine treatment, and extensive studies on the response of mites to irradiation.

The subprogramme is also committed to developing two new Coordinated Research Projects over the next five years in the areas of phytosanitary and sanitary applications of irradiation, including a newly proposed CRP on the 'Development of Generic Irradiation Doses for Quarantine Treatments'. A consultants meeting to develop this CRP concept will take place in Vienna in early November 2008 in close collaboration with the FAO/IAEA Insect Pest Control subprogramme.

Another proposed CRP is on the 'Use of Irradiation for Shelf Stable Sterile Foods for Immunocompromised Patients and Other Groups'. This CRP proposal on sanitary applications of irradiation will be further developed during 2009.

Collaborating Centres

The IAEA Department of Nuclear Sciences and Applications has been operating the IAEA Collaborating Centre scheme on a trial basis since 2004. The centres help to ex-

pand and deepen the programmatic base of the IAEA programmes.

The activities of the Joint FAO/IAEA Programme of Nuclear Techniques in Food and Agriculture are being enhanced by the University of Costa Rica, which was designated in 2007 as the **Collaborating Centre for eLearning and Accelerated Capacity Building for Food and Environmental Protection,** in partnership with the Korean Advanced Radiation Technology Institute (ARTI). The activities of the Collaborating Centre, whose mandate has recently been extended from 2009, is to help the FAO/IAEA to:

— Increase regional institutional capacity in food and environmental protection and support national initiatives

— Promote and accelerate capacity building activities, especially technical co-operation between developing countries

— Strengthen food safety and assure food security through an integrated food chain approach and the application of nuclear and related techniques

— Develop eLearning courses, including those in local languages

— Provide training to regional networks using local facilities

The completion (late 2009/early 2010) of state of the art training, research and boarding facilities at the ARTI will provide an additional means for the Republic of Korea to further the Collaborating Centre scheme by providing facilities for conducting FAO/IAEA training workshops in the application of standards related to food irradiation and the operation of irradiation facilities.

Working with International Organisations

The subprogramme is assisting in the collaborative development of texts for the control of post harvest pests of economic and/or quarantine importance through the Technical Panel on Phytosanitary Treatments under the International Plant Protection Convention (IPPC). The subprogramme hosted the Technical Panel on Phytosanitary Treatments in December 2006, which resulted in the further elaboration of the revised ISPM No. 18 'Guidelines for the Use of Irradiation as a Phytosanitary Measure'. The FAO/IAEA is also hosting the IPPC Technical Panel on Fruit Flies, including the latest meeting held during September 2008.

Irradiation Databases[3]

The subprogramme is responsible for updating and maintaining various databases as resources for researchers, government officials and the general public, including:
Food Irradiation Clearances Database

The database includes information on country name, class of food, specific food product, objective of irradiation, date of approval and recommended dose limit.
Food Irradiation Facilities Database

The database includes information on country name, facility contact details, type of irradiator and energy source.

Other relevant IAEA databases include the *International Database on Insect Disinfestation and Sterilization* (IDIDAS) and the *Food Contaminant and Residue Information System* (INFOCRIS).

Conclusions

Development oriented research supported by the FAO/IAEA through Coordinated Research Projects and the Seibersdorf Laboratories has produced many scientific and technical outputs in recent years, including updated knowledge of the optimal radiation doses for destroying bacteria, insects and other organisms in foodstuffs and other agricultural commodities that cause spoilage and human diseases while maintaining wholesomeness, nutritional value and other characteristics important to consumers.

The expanded development of irradiation technology will be further enhanced through strengthened international co-operation projects between the FAO/IAEA and Member States via the dissemination of information on the benefits of irradiation as a post harvest treatment technology. This includes the ongoing development of regional training facilities to enhance Member States knowledge on the use of irradiation as a quarantine treatment, as well as the further development of the IPPC Guidelines for the Use of Irradiation as a Phytosanitary Measure.

The Joint Division looks forward to its continuing collaboration with both FAO and IAEA Member States in facilitating trans-boundary agricultural trade by providing technical support for the development and harmonization of international sanitary and phytosanitary standards and to facilitate access to international markets and foreign exchange.

References

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IAEA 2004: Irradiation as a Phytosanitary Treatment of Food and Agricultural Commodities. IAEA TECDOC 1427.

[3] See http://www-naweb.iaea.org/nafa/databases-nafa.html. Updates would be gratefully received by the subprogramme

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Past Events

Mexican fresh guava treated with irradiation cleared to enter the USA

The US Department of Agriculture cleared the way for imports of fresh guava on 14 October 2008. Under this new rule published in the US Federal Register, fresh guavas from Mexico must be irradiated with a minimum absorbed dose of 400 Gray, and each consignment must be inspected by the Mexican National Plant Protection Organization.

Sterygenics operates an irradiation service for medical sterilization in an irradiation plant near Mexico City that has now been adapted to also allow fruit irradiation. Benebion, another company, is building a cobalt-based irradiation facility in the state of San Luis Potosi, in central Mexico, that plans to open next year, and that is designed specifically for phytosanitary purposes. In total, Mexico produces about 300,000 metric tons of fresh guavas, which until now are totally consumed in the domestic market due to a lack of a viable post-harvest treatment.

Regional Workshop on Integrated Analytical Approaches to Monitor, Control and Comply with Maximum Residue Limits for Pesticides; San José, Costa Rica; 9-13 July 2008

Technical Officers: Ian Ferris and Britt Maestroni

The Workshop was attended by 28 participants and took place in San José, Costa Rica, from 9 to 13 July 2008. The Workshop was opened by Dr. Henning Jensen Pennington, Vice-Rector of Research of the University of Costa Rica, who highlighted the challenges related to food security and energy as well as the growing awareness of the role of agriculture in sustainable development. In highlighting the contributions of pesticide residue laboratories in meeting good agricultural practices (GAP), the workshop was hosted one year after the inauguration of the IAEA Collaborating Centre for eLearning and accelerated capacity building for food and environmental protection (EACB). GAP is assessed by monitoring the presence of selected high impact-ranking pesticides in surface water and sediments. The strategy is to strengthen laboratory capabilities through accelerated capacity building thus delivering sustainable regional development. The approach depends on active participation of all Stakeholders, and on communication and effective feedback mechanisms between the laboratory and interested parties.

Objectives of Meeting

To create an awareness of integrated strategies for strengthening pesticide residue laboratory capabilities to monitor compliance with GAP. Specifically to:

1. Strengthen a regional network of participants as to the monitoring of the implementation of good agricultural practices (GAP) related to pesticide uses;
2. Enhance the coordination and harmonization of chemical and bioassay approaches in national laboratories focusing on the monitoring of pesticide residues and their impact;
3. Disseminate information and skills in the detection of pesticide residues and application of integrated pesticide exposure assessment to improve human and environmental safety as well as to facilitate international trade and regional development;
4. Familiarize participants with a first tier risk assessment tool, such as the pesticide impact rating index, and a laboratory information management system (Inkosi);
5. Demonstrate a quick and cheap multiresidue method of analysis (QuEChERS) for pesticide residues in water, sediments and food.

Conclusions and Recommendations

The Meeting noted the importance of:

1. Continuing efforts to create an awareness of more integrated approaches to address pesticide management issues and to develop relevant training materials for laboratories.

2. Involving active participation of all relevant stakeholders to improve GAP.
3. Striving for harmonized regional strategies for catchment identification, field sampling design, and sample collection protocols, as well as common minimum analytical protocols in terms of experimental design and quality control requirements.
4. Utilizing first-tier pesticide risk assessments to identify pesticides and pesticide management practices of concern.
5. Striving for quality management to ensure acceptance of analytical results and a better understanding of pesticide impact at a catchment scale across participating countries.
6. Establishing method performance parameters to help assess GAP and determining the validity of OECD pesticide data for local conditions.
7. Applying crop grouping and extending MRLs for speciality crops.
8. Working towards the implementation of a common set of tools to improve laboratory outreach while
9. Simplifying compliance with international standards.

Dr. Bert Kohlmann from EARTH University showing the waterquality indicators found in Costa Rican surface waters

And agreed to the following **recommendations**:

1. To apply a more holistic approach in the diagnosis and assessment of the food and environmental impacts of pesticides.
2. To hold regular stakeholders meetings to foster active participation, communication and effective feedback mechanisms between the laboratory and interested parties.
3. To adopt an integrated analytical approach, focusing on water, including both chemical analysis and bioassay.
4. To use PIRI as a first-tier risk assessment tool, especially in the identification of high impact pesticides and its application to monitoring the effectiveness of pesticide management practices within and between cropping systems.
5. To participate in inter-laboratory comparisons and in the annual reporting of laboratory results and monitoring data if available.
6. To utilize, where appropriate, labelled pesticides to establish method performance parameters and to determine site-specific pesticide sorption parameters.

Ms. Jessie Materita and Dr. Berthold Kettner conditioning SPE columns for the clean-up step for analysis of pesticides in water

7. To collaborate, where possible, in the development of harmonized MRLs and training materials through working groups and ongoing regional initiatives.
8. To apply, where possible, a common reporting/quality management tool, such as BIKA open source LIMS, to meet ISO17025 and participating laboratories requirements.

Kick-off meeting of the EU 7th Framework Project 'CONffIDENCE'; Brussels, Belgium; 19-20 June 2008

Technical Officer: Andrew Cannavan

The kick-off meeting for the EU 7th Framework Programme Project 'Contaminants in Food and Feed: Inexpensive Detection for Control of Exposure' (CONffIDENCE) took place in Brussels from 19 to 20 June 2008. The 4-year project has 17 partners from 10 countries and a budget of € 7.5 million, € 5.8 million from the EC. The main objective of the project is the development of novel, multiplex screening methods for a wide range of contaminants in high-risk products such as fish and cereal-based food and feed, and vegetables. The validated methods will be applied to provide data for risk assessment and for regulatory systems for food safety.

The Agrochemicals Unit Head participated in the kick-off meeting as chair of the project Advisory Board.

The technologies to be developed will be of importance not only within the EU, but also in many countries world

wide, and will be especially relevant to those developing countries that must demonstrate equivalence of their food safety standards with those of the EU in order to establish or maintain trade with the EU in food commodities. At the meeting, this point was accepted by the Project Management Board and it was agreed that countries outside the EU, especially developing countries, should be included as stakeholders in dissemination activities. This will directly benefit many IAEA member states.

The first annual meeting of the project consortium will be held in Barcelona, Spain, in March 2008.

Further information on CONffIDENCE can be accessed at http://www.conffidence.eu.

1st (Rome, Italy, 23-25 June 2008) and 2nd (Vienna, Austria, 10-14 November 2008) Sessions of the IAEA Incident and Emergency Centre (IEC) Work Group on Long Term Sustainability of Emergency Preparedness and Response Programmes

Technical Officer: David H. Byron

In July 2007, the 4th Meeting of Competent Authorities under the Early Notification and Assistance Conventions agreed that the Secretariat should establish a Work Group (WG) on sustainable infrastructure, as identified in the International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies. To respond to this suggestion, the Deputy Director General, Department of Nuclear Safety and Security, initiated the establishment of the *IEC Work Group on Long Term Sustainability of Emergency Preparedness and Response Programmes* (WG-EPR) to monitor and facilitate the Action Plan implementation and develop recommendations to ensure harmonization and long term sustainability of emergency preparedness and response programmes amongst Member States, the Secretariat and relevant international organizations.

The first meeting of the WG-EPR took place in Rome, Italy from 23 to 25 June 2008. The Reporting Officer, as well as Mr. R. Martincic (IAEA), participated at the meeting as members of the WG-EPR and Ms. L. Obrentz (IAEA) as secretariat for the WG.

The purpose of the first meeting was to review the Terms of Reference and organize the work of the WG by developing WG and subgroup work plans, determine the number of expert groups needed and to prepare and agree on the meeting schedule for the WG and its two subgroups until the Action Plan and WG mandate were completed at the end of 2009.

The meeting reviewed and discussed the Terms of Reference for the WG. Two subgroups and their respective Chairs were established (Subgroup on Implementation and Subgroup on Follow-up). Recommendations of the Action Plan Work Groups on International Communication and Assistance were presented and discussed and tasks related to follow-up recommendations were assigned to the WG-EPR and its subgroups for future consideration.

The 2nd Meeting of the WG was held at IAEA Headquarters in Vienna, Austria from 10 to 14 November 2008. Follow-up activities resulting from this most recent WG-EPR Meeting will be reported on in due course.

31st Session of the Joint FAO/WHO Codex Alimentarius Commission; Geneva, Switzerland; 30 June – 4 July 2008

Technical Officer: David H. Byron

The Joint FAO/WHO Codex Alimentarius Commission held its 31st Session at the International Conference Centre in Geneva, Switzerland from 30 June - 4 July 2008. The Session was attended by 505 delegates from 138 Member countries and 1 Member Organization and 44 international governmental and non-governmental organizations, including UN agencies. The session was opened by Mr. D. Heymann, Assistant Director-General, WHO and Mr. E. Boutrif, Director, Food and Consumer Protection Division, FAO, on behalf of the Directors-General of WHO and FAO, respectively.

In addition to those activities of the Food and Environmental Subprogramme presented under document CAC/31 INF/6 (*Report on Activities of the International Atomic Energy Agency Relevant to Codex Work*), the Reporting Officer also presented a PowerPoint summary of other activities (ALINORM 08/31/REP, para. 198) of the Joint FAO/IAEA Programme related to the consideration of multiple food contamination hazards affecting food safety and trade; inter-agency response to nuclear emergencies affecting food and agriculture, and; the application of ionizing radiation for sanitary and phytosanitary purposes.

The reporting officer also pointed out current Codex related activities undertaken by the IAEA in the area of seafood safety risk analysis, pesticide residues, contaminants and planned training workshops to assist in the implementation of Codex standards in Member States.

Highlighted future activities included intensified efforts for the development and application of research related to technical assistance, technology transfer and the elaboration of standards; increased collaboration with Member States in the implementation of food safety policy and regulatory programmes for the establishment of national and regional food control laboratories, and; increased inter-agency collaboration in the management of nuclear preparedness and response procedures for protection of the public.

The 32nd Session of the Joint FAO/WHO Codex Alimentarius Commission will be held at FAO Headquarters in Rome, Italy from 29 June – 4 July 2009.

Annual Meeting and Open Day of the EU 6th Framework Project 'BioCop'; York, United Kingdom; 2 September 2008

Technical Officer: Andrew Cannavan

The Agrochemicals Unit Head participated as a member of the Project Advisory Board in the Annual Meeting and Open Day of the EU 6th Framework Integrated Project 'New technologies to screen multiple chemical contaminants in food (BioCop)', held at the Central Science Laboratory, York, UK, 2 September 2008. The field of research of the project is in the development and implementation of new methods to prevent & monitor the occurrence of multiple chemical contaminants in foods through the use of advanced sample preparation techniques & emerging biotechnological screening approaches. The main project objectives are:

- Development of novel screening methods to detect multiple chemical contaminants in foods
- Training of scientists in developed technologies

A wide range of techniques have been developed for application to the detection of food contaminants, utilizing technologies such as transcriptomics, proteomics, molecular immunology, microarrays, biosensor technology, bioinformatics and mass spectrometry, and resulting in a number of rapid tests that can detect and identify many types of toxins in foods.

Most of the work packages within the project have now completed 3 years' research and development work and many of the technologies being explored have been developed to a stage where preliminary validation, or even inter-laboratory validation, is now under way or due to commence in the near future.

An important development has been the inclusion of a new project partner, with the objective of disseminating knowledge generated and transferring technology from the project to countries outside the EU. This development should help to harmonise food safety standards and methodology and minimize the impact that new policy-supporting technical developments within the EU will have in countries, especially developing countries, wishing to establish equivalence of food safety standards in order to export food commodities to the EU. The new project partner is the Veterinary Public Health Laboratory (VPHL) in Bangkok, Thailand. It is noteworthy that the VPHL has benefited in the past from IAEA TC fellowship training and participation of VPHL staff in FAO/IAEA training courses at Seibersdorf and in South East Asia. The project leader in Thailand, Dr. Sasitorn Kanarat, is a former contract holder in the IAEA Coordinated Research Project 'The development of strategies for the effective monitoring of veterinary drug residues in livestock and livestock products in developing countries' (D3.20.22), and a current collaborator with the Food and Environmental Protection Subprogramme in various activities.

The VPHL will be integrated into the project over the next few months. VPHL staff will be trained in the methods and technology developed through BioCop and will be involved in method validation, demonstration and training of scientists in South East Asia and throughout the world in training events organized and implemented with the assistance of BioCop project partners and with project funds.

The BioCop open day was held on 3 September. This was targeted mainly to a scientific audience and was open to both consortium members and stakeholders outside the project, and had several participants from commercial entities, the food production and processing industry and private sector food laboratories.

BioCop is a large, complex and ambitious project, which is making excellent progress. The results are likely to make a significant impact on the implementation of food contaminant testing and monitoring schemes. Some of the technologies developed are already nearing the stage where they can be implemented by regulatory laboratories, and some of the methodology is being incorporated in and further developed by EU 7th Framework projects.

The inclusion of a new developing country partner in the project with the objective of disseminating knowledge and technology to countries outside the EU is of potential benefit to a large number of IAEA and FAO Member States. The selection by the Commission of a laboratory with close contacts with the Joint FAO/IAEA Programme as the new partner should further enhance this opportunity.

Further information on the BioCop project is available at http://www.biocop.org/.

First International MoniQA Conference; Rome, Italy; 8-10 October 2008

Technical Officer: Britt Maestroni

MoniQA is an EU funded Network of Excellence working towards harmonisation of analytical methods for monitoring food quality and safety in the food supply chain. It is coordinated by the Vienna-based International Association for Cereal Science and Technology (ICC) and will receive €12.3 million in funding from the European Commission for its activities between 2007 and 2012. MoniQA seeks to establish sustainable integration of leading research institutions, industrial partners and small to medium-sized business working in complementary fields of food analysis to assure food quality and

safety. The main objective of the project is to overcome European and worldwide fragmentation in food diagnostic research by integrating key organisations.

The First International MoniQA Conference took place in Rome from 8 to 10 October, 2008. The conference, which was entitled 'Increasing Trust in Rapid Analysis for Food Quality and Safety', was jointly organised by the Italian National Institute of Research in Food and Nutrition (INRAN) and ICC on behalf of MoniQA. The event brought together a global audience of more than 200 food safety scientists, socio-economists, regulators, industry and trade representatives as well as media correspondents. The conference was divided into sessions on food authenticity; food additives; mycotoxins and phycotoxins; food allergens; chemical contaminants; microbiological contaminants; and horizontal issues. The participants discussed current challenges in avoiding and controlling unwanted substances in the food production chain and shared information on the newest developments and innovations in rapid and reliable analysis of food contaminants.

Speakers included representatives from the Food and Agriculture Organization of the United Nations (FAO) and the European Commission (EC) as well as experts on food safety issues from industry, research institutes and academia.

The session on 'Mycotoxins and Phycotoxins'included presentations on method performance, quality control and measurement uncertainty, sampling issues, and implications for the agri-food industry. Ms. Britt Maestroni, of the Agrochemicals Unit, gave an invited lecture entitled 'Sampling issues for mycotoxins' within the session on mycotoxins and phycotoxins. The presentation focused on the design, implementation and evaluation of effective sampling plans to minimise the misclassification of lots as positive or negative, thus minimizing both buyer's and seller's risks. A study, carried out under an IAEA Technical Cooperation Project, to determine the variability and distribution of fumonisin B1 in laboratory samples taken from contaminated lots of maize marketed in Nigeria was used to develop a model to predict the buyers' and sellers' risks associated with any given fumonisin sampling plan design developed for maize.

Also of interest to the conference participants and of relevance to the work of the Food and Environmental Protection subprogramme was a presentation on the need for harmonisation of mycotoxin methodology given by Michele Solfrizzo of the Institute of Sciences of Food Production, Italy. The results of a survey of current practices concerning the use and application of mycotoxin test-methods were presented. The results suggested that there is an urgent need for harmonization and that the primary issues are: accreditation, appropriate size of laboratory sample, guidelines on the most convenient analytical method for each combination of mycotoxins/matrix, method validation criteria, participation in proficiency testing, use of reference/certified materials, use of the same definition/calculation for LOD, LOQ, repeatability and measurement uncertainty.

Particularly of interest to the audience was the session on food authenticity. This refers to the issue of whether or not the food purchased by the consumer matches its description, often defined by legislation. The authenticity of food can be misrepresented in various ways, including economic adulteration of valuable foods (addition of inexpensive ingredients, extension with water, etc.), mislabelling of the geographical, botanical or species origin, non compliance with the standards set in legislation, and implementation of non acceptable process practices. Indicators of food authenticity may derive from genetics, territory (soil, climate, pollution, etc.), harvesting and post harvest treatment, processing conditions, and other functional ingredients affecting quality. The use of multielement stable isotope analysis in combination with multivariate statistics to determine the geographical origin of food was presented as a growing area of research within the EU.

There are several reasons why European consumers are increasingly interested in the origin of food: notably patriotism, decreased confidence in the quality and safety of products produced outside their local country or region, and last but not least, concerns about animal welfare and 'environmentally friendly' production methods. Recent food scares such as avian influenza and malpractice by some food producers have increased public awareness regarding both the validity of claims of origin and the means by which the food commodity has been cultivated or produced.

Fifth conference of The World Mycotoxin Forum; Noordwijk, The Netherlands; 17-18 November 2008

Technical officer: Josef Brodesser

The conferences of the World Mycotoxin Forum are amongst the most important meetings in the field of mycotoxins in food and feedstuffs. The fifth conference took place in Noordwijk, The Netherlands, on 17 and 18 November 2008. It covered the latest developments to combat the mycotoxin problem, including: presentations and discussions in plenary meetings and parallel sessions; poster sessions; spotlight presentations covering a wide range of topics including case studies and industry updates; a concurrent instrument/manufacturers exhibition providing information on products, equipment and services; and workshops.

Approximately 300 participants, regulators, scientists from various scientific disciplines, food industry representatives and suppliers of analytical equipment from countries throughout the world met to discuss problems and to exchange ideas on recent developments in the

field of mycotoxins. The Forum covered recent analytical techniques and results of toxicological studies, and regulatory matters, e.g., on mycotoxin maximum regulatory limits in international trade.

The mycotoxin problem is relevant worldwide and particularly for developing countries exporting nuts, maize, figs, grape, almonds, etc. Several of these countries participated, whereas Africa with its huge regional mycotoxin problems in general was represented only marginally.

After the opening of the conference the first day started off with the Plenary Meeting, entitled: Mycotoxins – Tour du Monde. The mycotoxin problem was looked at from a global perspective. The relevance and impacts of mycotoxin contamination on consumer health, food and feed quality as well as impacts on international trade were highlighted from the countries' point of view.

The afternoon lectures were given in two parallel sessions. The first one was entitled: Mycotoxins in the Food Chain – Emerging Problems and Solutions, the second one: Mycotoxins in the Feed Chain – Emerging Problems and Solutions. In the first session recent developments in analytical technologies were discussed, whereas the second one dealt with the impact of mycotoxin contamination on the feed chain and related matters, e.g. co-exposure and vaccinal response influenced by mycotoxins.

The first conference day concluded with three spotlight presentation sessions dealing with (a) Mycotoxin Analysis, (b) Mycotoxin Binders/ Inactivators, and (c) Sampling. Finally, the poster presentations provided an open forum to allow participants to discuss relevant issues with authors, industry representatives and other conference participants.

On the second conference day parallel sessions were held on (a) Mycotoxins in the Food Chain – Emerging Problems and Solutions, followed by subsession: Multifaceted Approach to Prevent Mycotoxin Contamination in the Field; and (b) Mycotoxin Analysis, followed by a subsession: Mycotoxin Analysis Tools of Tomorrow.

The conference concluded with the final plenary meeting entitled: What's next? Three presentations focused on global health and economic impacts, an EFSA assessment of potential consumer health risks by a possible increase of aflatoxin maximum levels, and possible changes to EU aflatoxin regulations, which were discussed by the panel. The closing lecture was given by the Special Envoy for the WHO and former European Commissioner for Health and Consumer Protection, Mr. D. Byrne.

Subsequent to the conference two workshops were offered on the following day on (a) Sampling and Import Control, and (b) Mycotoxin Detection and Risk Management.

In summary, the conference brought up a number of important scientific and technical aspects on mycotoxin toxicology, recent developments in analytical techniques, and reduction of toxins in feed by additives. Trends in setting maximum levels for international trade and the potential impact of increasing maximum levels were also considered.

Despite the obvious potential adverse effects on human and animal health, particularly due to the teratogenicity and cancerogenicity of mycotoxins, the importance of this problem seems not to be universally recognized as yet. Strengthening of preventive measures, especially in developing countries, could significantly reduce intoxications and the risk of cancer incidents. Irradiation as a post-harvest treatment, or radionuclide techniques, e.g., in applied research or in analytical method development, are only utilized to a limited extent so far. The potential of nuclear and related techniques in research was brought to the attention of the forum. The IAEA was asked to actively participate in the coming ISM Conference 2009, to be held in Tulln, Austria, in September 2009.

In a nutshell, contamination with mycotoxins is recognized as unavoidable. Three major components are involved in the attempt to minimize the risk: Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), and Hazard Analysis Critical Control Point principles (HACCP).

The conference helped to raise awareness of the potential for the use of radionuclide techniques in the field of mycotoxin research and analysis. Contacts made with participants will help to identify new fellowship opportunities for counterpart institutions dealing with the problem of mycotoxins for the benefit of various IAEA Technical Cooperation projects.

The conference also provided an opportunity to keep abreast of relevant developments, and to build awareness of the role and impact of the FAO/IAEA programme in food safety research and capacity building and to maintain and initiate collaboration especially for the benefit of IAEA developing Member States.

Abstracts of lectures and posters presented can be viewed electronically on the internet from the World Mycotoxin Journal[4].

[4] see http://wageningenacademic.metapress.com/content/k25374833690

20th Meeting of the Inter-Agency Committee for Response to Nuclear Accidents (IMO Headquarters; London, UK; 20-21 November 2008)

Technical Officer: David H. Byron

The 20th Regular Meeting of the Inter-Agency Committee on the Response to Nuclear Accidents (IACRNA) took place in London from 20 to 21 November 2008 at the invitation of the International Atomic Energy Agency. The International Maritime Organization hosted the meeting. Thirteen representatives of 10 international organizations (EC, EUROPOL, FAO, IAEA, IMO, INTERPOL, OECD/NEA, PAHO, WHO and WMO) attended. A representative from NATO (CEP) participated in the Meeting as an observer.

Both the reporting officer and Mr. Dominique Burgeon, Senior Operations Officer, FAO Emergency Operations Service (TCEO), represented the FAO at the IACRNA Meeting. A presentation was made on Activities of the Food and Agriculture Organization (FAO) Related to Preparedness and Response to Nuclear Emergencies, including the mandate of the newly established Food Chain Emergencies Management Unit (FCEMU) of the FAO Emergency Operations and Rehabilitation Division (TCE).

FAO Headquarters (Rome) and Joint Division (Vienna) collaborative activities include the improvement of inter-agency emergency preparedness and response management procedures, the application of agricultural countermeasures to mitigate immediate and longer term effects arising from radionuclide contamination, and the continued elaboration and revision of standards related to radiation protection of the public, including hazards arising from existing exposure situations.

Current and future FAO activities related to the IACRNA include the revision of the Joint Radiation Emergency Management Plan of the International Organizations (EPR-JPLAN 2009), the revision of the Coopertive Arrangements between FAO and IAEA for Information Exchange and Technical Support in Relation to Food and Agriculture in the Case of a Nuclear or Radiological Emergency (2010), revisions to the IAEA International Basic Safety Standards (BSS) for Protection against Ionizing Radiation and for the Safety of Radiation Sources, and the elaboration of the FAO Emergency Response Expert Qualifications and Roster of Consultants for field missions.

The Meeting recapitulated conclusions and outcomes from the 19th Regular Meeting, noted progress reports, discussed the ConvEx-3 (2008) Exercise Report, considered proposals for (1) the development of a new edition of the Joint Radiation Emergency Management Plan (JPLAN) including proposals for new cosponsors of the JPLAN, (2) a new series of the ConvEx exercises focused on malicious acts, (3) the IACRNA Work Plan until the 21st Regular Meeting and (4) proposal for a member of international organizations in the National Competent Authorities' Coordinating Group (NCACG).

The Meeting in principle endorsed the Exercise Report, agreed with the proposed ConvEx exercise regime and agreed with the process and proposed schedule for the JPLAN Edition 2009. The Meeting also discussed the name of the Committee and agreed to change the name to better reflect the IACRNA scope and functions to the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE).

The 21st Regular IACRNA Meeting will be hosted by the WHO in Geneva from 16 to 17 June 2010.

Additional information on the Inter-Agency Committee for Response to Nuclear Accidents can be found at the IACRNA website.

New Coordinated Research Projects

Development of radiometric and allied analytical methods to strengthen national residue control programs for antibiotics and anthelmintic veterinary drug residues

Technical Officer: Rajendra Patel

In many developing countries, rapid demographic changes and rising incomes have increased the demand for high value food commodities. Increasing domestic and international trade in these products has therefore led to a dramatic growth in the livestock and aquaculture sectors. Changes in production practices and exacerbating factors such as climate change have resulted in a rise in disease outbreaks and increased use of agrochemicals including veterinary medicines, with the concurrent development of microbial and parasitic resistance to these compounds. At the same time, awareness of food safety is rising and many countries have implemented food control regulations to guarantee the quality and safety of foods for their consumers. This includes control systems that encourage responsible use of veterinary medicines to combat drug resistance and comply with international standards. However, many developing countries find it difficult to access the required know-how and skills, thus hindering their access to international markets. One significant constraint is the capacity to generate surveillance data using analytical methods validated to nationally and internationally agreed standards.

Approaches for the detection of veterinary drug residues include microbiological, immunochemical, chromatographic and spectrometric techniques. While these may fulfil suitability criteria, such as method sensitivity, they require multiple time-consuming steps for extraction, sample clean-up or pre-concentration prior to measurement. These measurement techniques also often lack the robustness necessary for their successful application in developing countries.

A new Coordinated Research Project (CRP) has been proposed by the Food and Environmental Protection Subprogram (FEP) of the Joint FAO/IAEA Programme for Nuclear Techniques in Food and Agriculture (NAFA) to address these issues by developing robust analytical methods utilising nuclear and related technologies for the detection of veterinary drug residues.pathogens

A consultants meeting was convened in Vienna from 16 to 19 September 2008 to evaluate the proposal and make recommendations on planning and implementation of the CRP. The consultants were Dr Thomas Kuhn, Head of the Competence Centre for Veterinary Drugs and Hormones, Austrian Agency for Health and Food Safety, Vienna; Prof Hubert de Brabander, Dean of the Faculty of Veterinary Medicine, University of Gent; Dr. Vishweshwaraiah Prakash, Director, Central Food Technological Research Institute, Mysore, India; Prof Mathew Muzi Nindi, University of South Africa, Pretoria and Dr Sasitorn Kanarat, Director of Veterinary Public Health Laboratory, Bureau of Quality Control of Livestock, Thailand.

The meeting discussed the current situation in different regions of the world and recognised that veterinary drug residues are a problem in commodities produced in many developing countries. The development of drug resistance is also a problem in terms of reduced effectiveness of the drugs both in animal husbandry and for human health. The consultants were concerned that most control programmes in developing countries are focussed on export markets and highlighted the need for affordable technologies to ensure domestic consumer food safety. They agreed on the need to focus on compounds of significance in international trade of high value commodities, in particular antibiotics and anthelmintics.

After detailed discussions on the technologies available for residues detection the consultants concluded that:

- for the benefit of the countries with limited resources, the new CRP should include development of screening methods that do not require purchase of sophisticated equipment. To enable this, the approach used in a previous CRP (D.3.20.22) *'The Development of Strategies for the Effective Monitoring of Veterinary Drug Residues in Livestock and Livestock Products in Developing Countries (2002-2006)'* utilizing radioactive labelled streptavidin in a radioimmunoassay format should be further developed to provide screening assays for antibiotics and antiparasitic drugs. Such methods would empower developing countries to start establishing the national preliminary monitoring programs for veterinary drug residues;
- issues relating to extraction of residues from complex food matrices, sample clean-up and pre-concentration should also be addressed by the CRP;
- taking into account new developments in the field of high performance thin layer chromatography (HPTLC), the use of this technique for rapid detection of drug residues should be investigated as part of the CRP;
- stable isotopes labelled internal standards are vital for successful development of robust confirmatory methods and should be used. Technical contacts will be awarded to selected institutions to provide radioactive and stable isotope labelled reagents and internal standards for the CRP;
- to allow successful technology transfer, the methods developed during the CRP should be validated using the relevant guidelines and detailed SOPs written.

Development of Generic Irradiation Doses for Quarantine Treatments

Technical Officer: G. Luckman

In 2003, the International Plant Protection Convention approved the International Standard for Phytosanitary Measures 'Guidelines for the Use of Irradiation as a Phytosanitary Measure' (ISPM 18), which helped facilitate the start of international trade in irradiated fresh fruits between countries such as Australia and New Zealand in 2005, India and the USA in 2006 and between Mexico and the USA in 2008.

GeneticIrradiation Doses CRP consultants group

Despite these successes, important gaps in knowledge still remain. A previous IAEA Coordinated Research Project 'Irradiation as a Phytosanitary Treatment of Food and Agricultural Commodities' recommended in 2004 that generic doses for major arthropod groups should be investigated.

Regulatory authorities and scientists from many internationally recognised institutions have studied research data on the effectiveness of irradiation as a quarantine treatment against a large range of insect pest species infesting various fruits and vegetables. These include mites, thrips, mealybugs, weevils, aphids and scale insects.

Mites from the phytophagus families are important quarantine pests on a wide variety of fresh commodities. Research has been conducted on several species but larger scale testing to validate a commercial irradiation treatment has only been conducted for one species (*Brevipalpus chilensis*). It would be valuable to determine a default generic dose for all mites as this group is among the most radiation tolerant and a default dose for mites would assist in the validation of a generic dose for all phytophagus Arthropoda.

A consultants meeting was convened in Vienna from 3-7 November 2008 to plan and implement the development of the new CRP for generic irradiation doses. The consultants were Guy Hallman from the USA Department of Agriculture, Peter Leach from the Queensland Department of Primary Industries and Fisheries in Australia; Mohammed Mansour from the Syrian Atomic Energy Commission; Meixu Gao from the Chinese Academy of Agricultural Science and Valtur Arthur from the University of Sao Paulo in Brazil.

After detailed discussions on the issues involved in setting generic irradiation doses detection the consultants concluded that:

i. A set of guidelines should be developed during the first Research Coordination Meeting (RCM) on the application and reporting of dosimetry to ensure consistency.

ii. Research protocols should be developed during the 1st RCM that includes, among other things, definitions of the measure of efficacy for irradiation as a phytosanitary option, for all the arthropod groups that will be studied under the CRP.

iii. The CRP outcomes should facilitate the finalisation of IPPC treatments and standards that deal with phytosanitary applications of irradiation.

iv. A high priority should be given to develop a generic dose for all phytophagous mites.

v. A generic dose for all weevils should also be developed.

vi. Reducing the generic dose of 400 Gy for all Insecta (except pupae and adults of Lepidoptera) should be investigated.

vii. The CRP framework should consider the outputs of previous CRP and synergies with related TC country and regional irradiation projects.

viii. Large scale testing up to 30000 insects should be considered in confirming that the selected dose is efficacious.

The project will establish validated irradiation doses for non fruit fly species of quarantine significance. The project results will strengthen existing irradiation standards developed by the International Plant Protection Convention, thereby facilitating international trade for various fruits and vegetables through the use of generic irradiation doses for a wide range of quarantine pests.

Calls for proposals

We are pleased to announce that both CRPs have been approved by the IAEA Research Committee, and formal calls for proposals will be advertised. It is anticipated that the projects will start by June-July 2009 and up to 10 research contracts will be awarded to Member States submitting appropriate research proposals.

Each Principal Scientific Investigator will have to submit his/her project highlighting current equipment and experience levels in their laboratory together with an indication of availability of adequate funds for relevant research activities. Leading experts in the field will be invited to support the CRP as Agreement holders. Details of how to apply can be found on the IAEA website (http://www-crp.iaea.org).

Current Technical Cooperation Projects

Project Number	Title and Project Objectives	Technical Officer
ALG5025	Strengthening Capabilities to Control Veterinary Drug Residues in Foodstuffs	Patel, Rajendra Kumar P. (NAFA) Cannavan, Andrew (NAAL)
ANG5003	Veterinary Drug Residue Monitoring Programme	Patel, Rajendra Kumar P. (NAFA) Cannavan, Andrew (NAAL)
ARG5011	The Use of Ionizing Radiation for the Phytosanitary Treatment of Fresh Fruit	Luckman, Gary (NAFA) Byron, David Henry (NAFA)
BEN5003	Veterinary Drug Residue Monitoring Programme	Viljoen, Gerrit Johannes (NAFA) Cannavan, Andrew (NAAL) Patel, Rajendra Kumar P. (NAFA)
BEN5004	Regulatory Control and Monitoring of Mycotoxins to Facilitate Trade	Brodesser, Peter Josef (NAFA) Byron, David Henry (NAFA)
BGD5024	Phytosanitary Treatment for Insect Pests Infesting Fresh Fruits and Vegetables	Luckman, Gary (NAFA) Byron, David Henry (NAFA)
BKF5005	Regulatory Control and Monitoring of Contaminants and Residues	Brodesser, Peter Josef (NAFA) Maestroni, Britt Marianna (NAFA)
BOL5015	Developing Pesticide Residue Monitoring Capabilities in Support of Cash Crops	Ferris, Ian Glen (NAFA)
BOL5017	Capacity for Monitoring Pesticide Residues for Compliance with Minimum Risk Levels and Good Agricultural Practice According to ISO 17025	Ferris, Ian Glen (NAFA) Maestroni, Britt Marianna (NAFA)
BRA5058	Applying Ionizing Radiation for Food Security and Healthcare	Luckman, Gary (NAFA) Byron, David Henry (NAFA)
CHI5046	Certification of Exported Animal Products Using Nuclear and Other Analytical Techniques	Patel, Rajendra Kumar P. (NAFA) Cannavan, Andrew (NAAL)
COL5021	Cost Benefit Assessment for the Modernization of an Irradiator in Colombia	Luckman, Gary (NAFA) Sampa, Maria Helena de O. (NAPC) Pacheco Jimenez, Ronald Enrique (NSRW)
COL5022	Assessment of the Impact of Pesticide Use in Lake Tota, Boyacá, Colombia	Ferris, Ian Glen (NAFA) Maestroni, Britt Marianna (NAFA)
COS5026	Management and Appropriate Use of Insecticide-nematicides	Ferris, Ian Glen (NAFA)
CPR5016	Strengthening the Quality Assurance System for Food Irradiation	Luckman, Gary (NAFA) Byron, David Henry (NAFA)

Project Number	Title and Project Objectives	Technical Officer
ERI5005	Zoonotic (diseases that can be transmitted from animals to humans) Disease Control and Analysis of Veterinary Residues in Foods	Patel, Rajendra Kumar P. (NAFA) Unger, Hermann (NAFA)
GUA5015	Establishing a Food Irradiation Plant	Luckman, Gary (NAFA) Byron, David Henry (NAFA)
HAI5003	Enhancing Crop Productivity through the Application of Isotope Nuclear Techniques	Heng, Lee Kheng (NAFA) Ferris, Ian Glen (NAFA)
INS5033	Enhancement of Quality Assurance for the Analysis of Veterinary Drug Residues	Patel, Rajendra Kumar P. (NAFA) Cannavan, Andrew (NAAL)
IVC5027	Monitoring of Pesticide Residues in Food Products	Brodesser, Peter Josef (NAFA) Maestroni, Britt Marianna (NAFA)
MAK5005	Upgrading of Food Safety System	Brodesser, Peter Josef (NAFA) Maestroni, Britt Marianna (NAFA)
MLI5018	Regulatory Control and Monitoring of Pesticides and Residues in Fresh Produce	Brodesser, Peter Josef (NAFA) Byron, David Henry (NAFA)
MNE8002	Upgrading a Persistent Organic Pollutant Laboratory towards Accreditation for Environmental Monitoring	Safrany, Agnes (NAPC) Brodesser, Peter Josef (NAFA)
MON5012	Monitoring of Residues in Livestock Products and Surveillance of Animal Diseases	Cannavan, Andrew (NAAL) Crowther, John Richard (NAFA)
MOR5024	Industrial Application of Irradiation	Luckman, Gary (NAFA) Byron, David Henry (NAFA)
MOR5029	Conserving and Improving the Quality of Aromatic and Medicinal Plants through Irradiation, and Transfer of this Procedure on an Industrial Scale	Luckman, Gary (NAFA) Sampa, Maria Helena de O. (NAPC)
MYA5015	Strengthening the National Capacity for the Production of Veterinary Vaccines	Crowther, John Richard (NAFA) Cannavan, Andrew (NAAL)
NIC5007	Determining Drug Residues in Bovine Meat Exports	Patel, Rajendra Kumar P. (NAFA) Cannavan, Andrew (NAAL) Brodesser, Peter Josef (NAFA)
NIR5033	Improvement of Quality Management and Food Safety Monitoring Using Isotope Techniques	Brodesser, Peter Josef (NAFA) Byron, David Henry (NAFA)
NIR5034	Feasibility Study on the Optimal Use of an Industrial Gamma Irradiation Facility	Sampa, Maria Helena de O. (NAPC) Luckman, Gary (NAFA)

Project Number	Title and Project Objectives	Technical Officer
PAN5017	Monitoring Pesticide Residues in the Production of Tropical Fruit (Pineapples and Melons) and Controlling Analytical Quality with the Aid of Nuclear Techniques	Ferris, Ian Glen (NAFA) Maestroni, Britt Marianna (NAFA)
PHI5030	Upgrading the Gamma Irradiation Facility	Sampa, Maria Helena de O. (NAPC) Haji-Saeid, Seyed Mohammad (NAPC) Luckman, Gary (NAFA)
RAS5046	Novel Applications of Food Irradiation Technology for Improving Socioeconomic Development (RCA)	Luckman, Gary (NAFA) Byron, David Henry (NAFA)
RER9074	Long-Term Countermeasure Strategies and Monitoring of Human Exposure in Rural Areas Affected by the Chernobyl Accident	Berkovskyy, Volodymyr (NSRW) Ferris, Ian Glen (NAFA) Fesenko, Sergey (NAAL)
RLA5050	Strengthening Laboratory Capacity to Assess the Implementation of Good Agricultural Practices in the Production of Fruit and Vegetables in Latin America	Ferris, Ian Glen (NAFA) Dercon, Gerd (NAFA) Maestroni, Britt Marianna (NAFA)
ROK5034	Nutrient Efficient Crops and Safe Use of Pesticides in Sustainable Crop Production	Ferris, Ian Glen (NAFA)
SLO5002	Protecting Groundwater and Soil against Pollutants Using Nuclear Techniques	Adu-Gyamfi, Joseph Jackson (NAAL) Ferris, Ian Glen (NAFA)
SRL5039	Monitoring of Chemical Residues and Food-borne Pathogens	Cannavan, Andrew (NAAL)
SRL8019	Technical Support for the Establishment and Operation of a Multi-Purpose Gamma Irradiation Facility	Sampa, Maria Helena de O. (NAPC) Luckman, Gary (NAFA)
URT5024	Nuclear Techniques for the Monitoring of the Food Quality in the United Republic Of Tanzania	Brodesser, Peter Josef (NAFA) Byron, David Henry (NAFA)

Agrochemicals Unit, FAO/IAEA Agriculture & Biotechnology Laboratory, Seibersdorf

Food safety training activities in the Agrochemicals Unit of the FAO/IAEA Agriculture & Biotechnology Laboratory, Seibersdorf

A major component of the work of the Food and Environmental Protection subprogramme, and the Agrochemicals Unit in particular, for a number of years has been training of Member State scientists, technicians and food safety regulators, mainly from developing countries, on various topics to assist in the implementation of holistic farm-to-fork food safety systems. The training is focused primarily on the application of nuclear and related techniques to detect and control chemical contaminants such as veterinary drug residues, endocrine disruptors, mycotoxins and pesticides in food. This training is an integral part of the Agrochemicals Unit's overall work programme, which includes applied/adaptive research, analytical method development and validation to support technology transfer; and the provision of data and expertise to underpin the development of international standards through bodies such as Codex Alimentarius. The overall objective of our activities is to support and assist Member States in improving food safety and meeting the requirements for international trade in food commodities.

The above activities are all interconnected. For example, interns or fellows under specific Technical Cooperation Projects are trained in the Agrochemicals Unit through direct involvement, under the supervision of Unit staff, in the development and validation of analytical methods and procedures which are needed in their countries. The method protocols produced are disseminated through publication in the scientific press and the internet and through their use for training future fellows and in training courses. The trainees gain knowledge and expertise through hands-on experience of method development and analytical strategies including ^{14}C-radiotracer techniques in food contaminant analysis, sample processing and preparation, instrumental analysis using a variety of modern techniques such as thin layer chromatography (TLC) high performance liquid chromatography (HPLC), gas chromatography (GC), isotope dilution methods using hyphenated mass spectrometry (MS) techniques (GC-MS, LC-MSMS), routine maintenance and optimisation of such instruments, protocols for method validation, and laboratory quality assurance and quality control principles. Training in these topics is also provided through inter-regional training courses and workshops, generally held annually at Seibersdorf under the auspices of the FAO/IAEA Training and Reference Centre for Food and Pesticide Control. These events are designed on a 'train the trainer' basis, so that the knowledge gained at the workshops or courses will be widely disseminated upon the return of the participants to their home institutes.

Development of these skills and transfer of the technology and methodology is very important in terms of assisting laboratories in Member States to realise their role in their countries' food safety systems and in helping to ensure that those systems meet the requirements for trade as specified in the Codex guidelines. Increased expertise and awareness of these issues also helps Member States to play a more active role in the development of guidelines and standards through participation in the appropriate Codex committees.

Training workshop participants (2008)

A very important aspect of the training activities is the interaction between the participants, leading to the creation of global networks of laboratories and institutes that can share information, experience and expertise. The Agrochemicals Unit plays a lead role in the creation, expansion and maintenance of these networks.

Over the past 10 years, more than 75 TC fellows and interns have been trained individually in the Agrochemicals Unit and taken their expertise back to their home institutes. Since 2005, the Agrochemicals Unit has also run 4 training workshops at Seibersdorf, involving approximately 90 participants from more than 50 developing countries. Feedback from our trainees is generally very good, and many follow-up training courses, workshops and seminars have been organised and implemented in their home countries by participants in the courses and workshops at Seibersdorf, using the knowledge gained and training materials provided. The training courses held at Seibersdorf have also been augmented by a number of regional courses and workshops hosted in various Member States.

FAO/IAEA Training Workshop; 'Introduction to Quality Assurance/Quality Control Measures in Pesticide Residue Analytical Laboratories'; Seibersdorf, Austria; 13 October – 7 November 2008.

Technical officers: Andrew Cannavan & Britt Maestroni

The most recent training workshop, entitled 'Introduction to quality assurance/quality control (QA/QC) measures in pesticide residue analytical laboratories' was held at Seibersdorf in October-November 2008. Although workshops on this topic have been run previously (most recently in 2005 and 2006), the workshop programme is continually developed, updated and refined to reflect the dynamic nature of food safety issues, quality systems and the responses demanded of analytical laboratories.

QA/QC lecture

The objectives of the workshop were to introduce and elaborate the QA/QC principles relevant to pesticide residue analysis according to the ISO 17025 Standard and Good Laboratory Practice (GLP) Guidelines, and to discuss the various roles of quality assured laboratories in the application and monitoring of the effectiveness of good agricultural practices. The programme included lectures, laboratory practical sessions and demonstrations, discussion and feedback sessions and visits to a national regulatory laboratory and a private laboratory engaged in pesticide residue analysis, both of which are accredited to ISO 17025. Topics covered at Seibersdorf included: the principles of laboratory quality control and quality assurance systems and the implementation of ISO 17025 and GLP; radiotracer techniques in residues analysis; basic statistics in residue analysis; sampling procedures; quality control of analytical methods including sample preparation, extraction, clean-up, instrumental analysis for detection, quantification and confirmation of residues; estimation of uncertainty; method validation; new developments and trends in pesticide residue analysis, and risk assessment.

The workshop had 21 participants, 10 female and 11 male. Developing countries from various regions of the world were represented, with 7 participants from Asia, 7 from Africa, 4 from Latin America and 3 from Europe. The majority of participants were analysts with some experience in pesticide residue analysis, though a few candidates were included from institutes wishing to develop a capability for pesticide residue analysis for regulatory purposes. It was considered that the information provided in the workshop, and the opportunity to network with other residues laboratories, would be of benefit to those countries in optimising the use of their available resources to plan and develop their laboratories.

Lectures and practical sessions were presented by members of the Agrochemicals Unit, and other IAEA and FAO staff. A number of external lecturers also contributed, including representatives of CVUA Stuttgart (EU Community Reference Laboratory for Pesticides), the European Food Safety Authority (EFSA), the Austrian Agency for Health and Food Safety (AGES), Wessling Hungary, AGROVET, Waters Corporation, Agilent and Thermo Fisher Scientific.

The discussion and feedback sessions held at various stages of the workshop provided opportunities for the participants to consider and debate aspects of particular relevance to their own laboratories between themselves and with the staff and experts present. These sessions were lively and all workshop participants contributed.

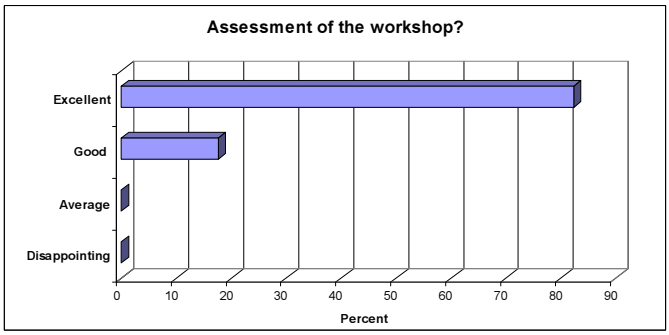
For the final week of the workshop, the participants were encouraged to think in broader terms and to consider the role that their laboratories play in supporting good agricultural practices, enhancing food safety and enabling trade in food commodities. Within this context, the need for laboratories to produce reliable data through the implementation of quality assurance systems and quality control procedures was emphasised. The workshop concluded with a round-table discussion on these issues.

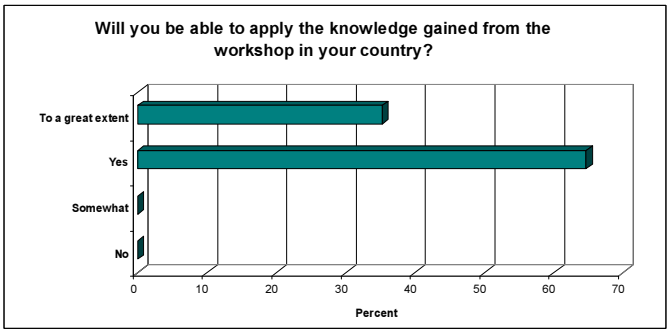
Opening of the workshop at VIC

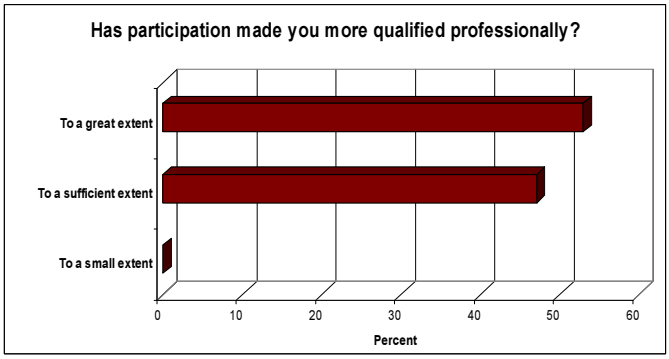
Immediate feedback on the effectiveness of the workshop was gained via feedback sessions during the workshop and a detailed evaluation questionnaire completed by the participants on the final day. The feedback received provided confirmation of the importance of these workshops and other training activities to our Member States. Feedback on the workshop sessions on radiotracer techniques

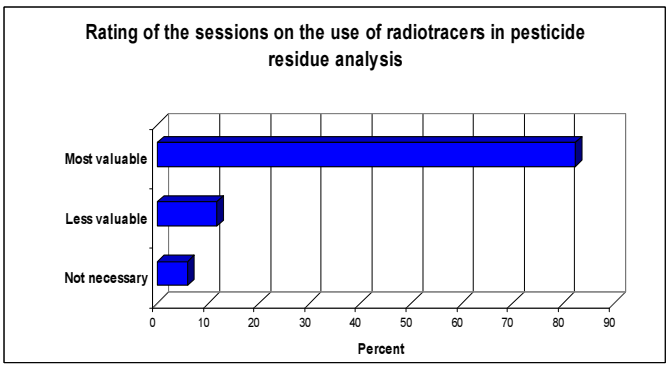
in residues analysis verified the value of nuclear techniques in residues analysis and research. The charts below summarising the participants' responses with respect to some important aspects of the workshop indicate its effectiveness and suggest successful future outcomes in individual countries.

Continued feedback and interchange between the laboratories and the Agrochemicals Unit will be maintained through email and by telephone.









EU 6th Framework Project 'ProSafeBeef'

The Agrochemicals Unit Head participated in the 18 month meeting of Workpackage 1.4, 'Chemical Residues', of the EU 6th Framework Integrated Project 'Improving the quality and safety of beef and beef products for the consumer in production and processing' (ProSafeBeef), in which the Agrochemicals Unit is a partner. The Unit is involved in the development and validation of analytical methodology to underpin risk assessment related to the use of anthelmintic compounds in animal production, primarily beef, and has responsibility for the subsequent transfer of the method(s) to the International Cooperation (INCO) project partner in Brazil (Microbioticos).

Development and validation of a multi-residue isotope dilution assay for the determination of 37 anthelmintic drugs or their metabolites by liquid chromatography- tandem mass spectrometry (LC-MSMS) has been completed at The Agriculture and Food Development Authority (Teagasc, Ireland). A draft standard operating procedure for the method has been transferred to IAEA and a partner laboratory in UK, Queens University Belfast (QUB). LC-MSMS operating parameters have already been optimised at Seibersdorf and sent to Microbioticos to permit them to start setting up their LC-MSMS. The full analytical method is undergoing final refinement and validation at Seibersdorf before transfer to Microbioticos. Transfer of the method is scheduled for early 2009.

Assuming successful transfer of the method, Brazil will have the analytical tools necessary to perform both a risk analysis and routine testing/monitoring of produce for a wide range of possible anthelmintic residues.

A sampling regime to be performed by another project partner, the Organización de Consumidores y Usuarios (OCU, Spain) was approved at the meeting. Sampling of beef products from retail outlets will begin in October 2008 in five European countries and will continue at regular intervals for a two year period. The analytical results from this targeted sampling will be processed by The Institute of Food Safety (RIKILT, The Netherlands) to provide an analysis of the risks associated with residues of anthelmintic compounds in beef on the European market. The results will be reported to all stakeholders via OCU consumers' newsletters, web publications and reports to the European Commission.

Sampling will begin in Brazil in early 2009, targeted at beef from producers certified for export to the EU. Analysis of the samples using the method transferred via IAEA will facilitate a risk assessment similar to that performed in Europe to be performed in Brazil. The project outcome in Brazil should be the development of the capability for the Brazilian competent authorities to perform appropriate risk assessments and to put in place an effective monitoring and feedback mechanism for the control of anthelmintic drug use in beef production.

Future transfer of the method(s) developed to other IAEA member states will assist in building their risk assessment and management capacities.

Staff

There have been several staff changes in the Agrochemicals over the past few months.

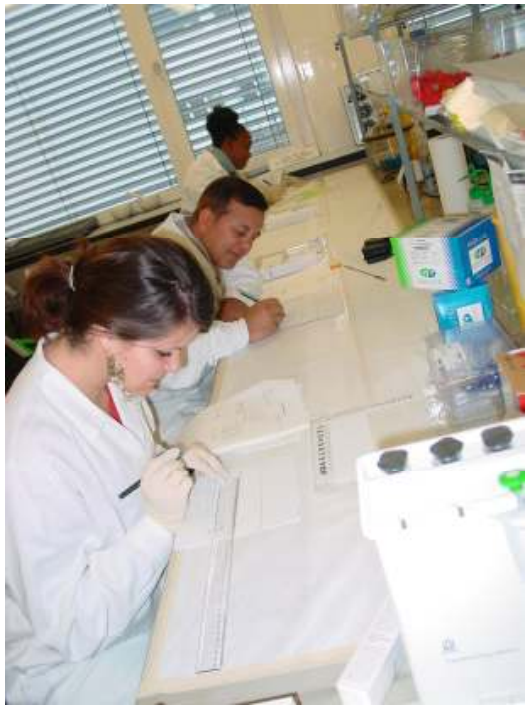
Mr. Philipp Klaus left the Unit at the end of June to take up a position in the Agency's Isotope Hydrology Laboratory. Ms. Mariana Schweikert Turcu left the Unit to take up a post at higher grade in the Safeguards Analytical Laboratory at Seibersdorf. Mariana and Philipp take with them our best wishes for their future careers.

Sample preparation practical session at the 2008 training workshop

Ms. Alla Kist joined the Unit on 1st September on temporary assignment as a laboratory technician. Mr. James Sasanya also joined us in September as a consultant analytical chemist and Ms. Rola Bou Khozam joined as a consultant in October, with duties as an analytical chemist and QA system specialist. All three of our new staff have already contributed significantly to the work of the Unit in general and especially to the successful implementation of the training workshop 'Introduction to QA/QC measures in pesticide residue analytical laboratories', which was held in the Unit from 13 October to 7 November.

In the second half of 2008, the Agrochemicals Unit accommodated 11 TC Fellows.

Ms. N. Sibanc (Slovenia)) and Mr. J. Jimenez Gonzalez (Colombia) joined the Unit in October for 1 month to participate in the training workshop 'Introduction to QA/QC measure in pesticide residue analytical laboratories' (see the feature article in this issue). Ms. S. A. Assey (Tanzania)), Ms. M. L. Trigo Orsini (Bolivia) and Mr. K. El Hawari (Lebanon) also commenced in October and participated in the above workshop as part of longer fellowships. Ms. V. E. Kirs (Argentina), Ms. A. Parada Carrasco (Chile), Ms. D. Dutra and Ms. D. H. Baggio Ribeiro (Brazil), Ms. C. S. Mosquera Vivas (Colombia), and Mr. M. A. Masis Mora (Costa Rica) joined the Unit in November for one month's training on the application of gas chromatography-mass spectrometry in pesticide residue analysis.



Thin Layer Chromatography practical session at the 2008 training workshop

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