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Nuclear Techniques in Food and Agriculture

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To the Reader

Ensuring the safety and quality of foods and agricultural commodities is one of the essential dimensions of national responses to tackle the twin challenges of expanding urbanization and improved public health. Countries can increase their social and development objectives through greater access to international and domestic food commodity markets. This requires agricultural control systems that are designed to ensure food quality and safety throughout the food production chain. Parallel with these developments has been the establishment of legal instruments at the international, national and local levels aimed at improving the environmental management of agricultural systems. These are intended to prevent or reduce various aspects of environmental degradation through a combination of operations that ensure the efficient and safe use of agricultural production inputs, and having in place emergency action procedures to minimize the risk of pollution or contamination from accidents.

In addition to the continuing use of irradiation for sanitary purposes, Member States have increased their use of irradiation for phytosanitary applications, especially those applications related to quarantine measures. The role of the analytical laboratory in the application of good production practices throughout the food chain, as opposed to the more traditional end-product testing of products, is also being strengthened with a view towards ensuring food safety and the reduction at their source of hazards arising from chemical, microbiological and radionuclide contamination. These activities entail the development of analytical methods and procedures that enable governments to evaluate the impact of their application of good production practices, including in the identification and use of environmental indicators related to water and soil.

IAEA
International Atomic Energy Agency

Emergency planning and response to nuclear emergencies and radiological events is also of growing importance in our joint international activities, particularly with regard to increasing the capabilities of FAO as a critical counterpart in defining and implementing agricultural countermeasures in response to such events through emergency response procedures.

These collaborative activities helped to ensure the successful adoption of the revised Codex Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade at the recently held 29th Session of the Joint FAO/WHO Codex Alimentarius Commission (Geneva, Switzerland, 3-7 July 2006). Other FAO activities related to emergency preparedness and response include their participation in the 21st Meeting of the Radiation Safety Standards Committee (RASSC) at IAEA Headquarters (9-11 October 2006) as well as their planned contribution to the forthcoming 26th Meeting of the OECD Working Party on Nuclear Emergency Matters at the OECD Nuclear Energy Agency in Paris, France from 28-30 November 2006. The FAO also looks forward to hosting the next Inter-Agency Committee for Response to Nuclear Accidents (IACRNA) at FAO Headquarters in Rome, Italy from 26-27 April 2007.

Joint Division collaboration with FAO and other relevant governmental and non-governmental agencies through current and future joint activities is also a critical aspect of our subprogramme efforts related to laboratory control of pesticides and mycotoxins and our expanded emphasis on the detection of residues of veterinary drugs in foods. These efforts not only provide a source of quality data to international scientific expert bodies to assist in their risk assessment activities, but also enhance communication between laboratories and other relevant parties so as to better inform public opinion.

These activities include our recent hosting of the FAO/IAEA Workshop on Quality Assurance/Quality Control Measures in Pesticide Residue Analytical Laboratories (Seibersdorf Laboratories, 11 September-6 October 2006) as well as a Joint IAEA/FAO/IUPAC Regional Workshop on Pesticide Management Practices and Enhancing Laboratory Capacity in the Republic of Korea from 14-16 August 2006. In addition to attendance at the Consultants Meeting on Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Assessment (IAEA Marine Environment Laboratories, Monaco, 25-27 September 2006), we have hosted the IPPC Technical Panel on Phytosanitary Treatments at IAEA Headquarters in Vienna from 4-8 December 2006.

In closing, we all wish to convey our heartiest congratulations and best wishes to Stella Attakpah in undertaking her new position with the Economic Commission for West African States (ECOWAS) in Dakar, Senegal. At the same time, we all extend our warmest welcome to our new Secretary, Christian Vornberg, who will undertake his duties at the first of the year.

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

Sincerely,

David H. Byron

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Feature Article

Training Workshop on Introduction to Quality Assurance/Quality Control Measures in Pesticide Residue Analytical Laboratories; Seibersdorf Laboratories; 11 September-6 October 2006

Technical Officer: Andrew Cannavan

One of the major activities of the Food and Environmental Protection Sub-programme is training. The Agrochemicals Unit at Seibersdorf is the central laboratory of the FAO/IAEA Training and Reference Centre for Food and Pesticide Control (TRC). The TRC was established to strengthen the analytical capabilities of developing country Member States and to assist in the control of food safety and quality, especially with respect to meeting international requirements for safe, quality assured products which would allow them to participate more readily in international trade. It also helps introduce and implement quality assurance and quality control systems in testing laboratories in Member States.

The Agrochemicals Unit contributes to the activities of the TRC through laboratory-based training in subjects such as laboratory quality assurance and quality control (based on the principles of ISO 17025 and OECD Good Laboratory Practice), pesticide residue analysis and veterinary drug residues analysis. Since the inception of the TRC, many such courses have been held. The most recent of these was the training workshop "Introduction to Quality Assurance/Quality Control Measures in Pesticide Residue Analytical Laboratories", which was held from 11 September to 6 October 2006 at the Seibersdorf Laboratories.

An announcement was made in February 2006, and Member States' governments were informed via an official letter of the call for nominations for suitable analysts. More than 80 applications were received in Seibersdorf by the end of April. Qualified candidates not selected are retained in the data base of the Agrochemical Unit, so that they may be informed of other training events.

Nineteen candidates from developing countries were selected for the training workshop. The selection was based on objective criteria such as age, gender, qualifications, years of experience in pesticide residue analysis, type of work, experience in quality systems, and English language capability.

Statistics of Workshop 2006

The participants, although varying to some degree in experience and background, proved to be well informed, enthusiastic, and interactive during the whole duration of the course. The working style of the participants benefited from a team-building exercise that was carried out during the first day of the workshop, and which set a good working climate. Team building associated with soft skills such as presentation skills and report writing proved to be very successful and resulted in good interaction and information exchange between the participants from the start of the workshop.

The opening of the workshop on 11 September 2006 took place at Vienna International Centre and comprised opening speeches and introductory key lectures on Codex Alimentarius and Food Safety, the latter given by a representative of AGES, the Austrian Health and Food Safety Agency.

The goal of the workshop was to provide a basic understanding of the principles of laboratory quality management systems and the quality control procedures necessary to apply such systems, and the programme comprised lectures, discussion and feedback sessions, and practical exercises in the laboratory.

The lectures covered topics such as basic statistics, quality principles and systems, accreditation, documentation of laboratory work, method validation, measurement uncertainty, reporting of results, sample extraction and clean-up, and new developments in pesticide residue analysis. Lectures were presented by staff of the Agrochemicals Unit and the Food and Environmental Protection Section and other IAEA staff, and by invited lecturers from Germany, Hungary, the Czech Republic and Thailand. It is noteworthy that the lecturer from Thailand had attended the previous workshop in 2005 as trainee.

In the first week of the course, participants also gave individual presentations on their pesticide residue laboratories and identified analytical and quality control aspects they wanted to target during the workshop.

The practical sessions included demonstrations of sample preparation, extraction and clean-up techniques and group sessions on TLC, HPLC, GC, GC-MS and LC-MSMS methods. The emphasis was on identifying, discussing and demonstrating quality control issues such as system suitability checks and the use of recovery samples and control charts.

The workshop also included presentations on HPLC, GC troubleshooting and GC/MS, provided by personnel from Agilent and Waters Corporation, and a visit to the AGES laboratories in Vienna, where workshop participants viewed the procedures in place for sample reception, processing and analysis in an accredited national laboratory.

Sample preparation exercise

Break-out sessions were organized during the final week of the workshop, in which the participants, in four working groups, performed a critical review of the SANCO document 10232/2006 relating to "quality control procedures for pesticide residue analysis". Each group presented their analysis of the document and its applicability in developing country laboratories, and common problems and possible solutions were discussed amongst the participants.

The final morning of the workshop was taken up by a presentation and round-table discussion session, which included representatives of FAO and AgroVet. To introduce the round-table discussion, each of the four working groups of participants gave a presentation on the role of the quality assured analytical laboratory in the implementation of good agricultural practices in relation to pesticide management, food safety and trade.

The session was closed with the presentation of certificates, all participants having fulfilled the criteria for successful completion of the workshop.

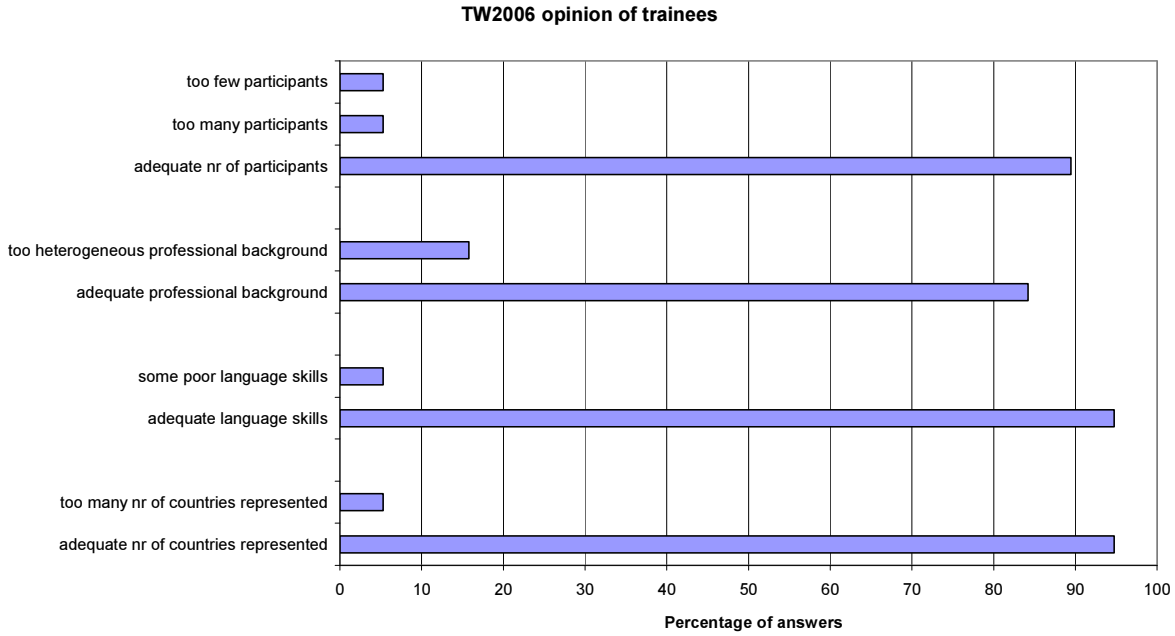
Participants in the programme gained experience which should enhance their professional capabilities. They should be able to use the experience and knowledge gained to improve conditions in their home laboratories through better implementation of quality assurance and quality control measures, thereby assuring the quality of pesticide residue data produced. It is also envisioned the participants will spread the information further through the organization of training workshops in their own institutes and involving their colleagues. The organizing team hope to receive feedback in the near future regarding the status of implementation of quality systems and, where appropriate, the achievement of accreditation of the residue laboratories.

Overall, the workshop was considered very successful, due in no small part to the enthusiasm and interaction of the participants.

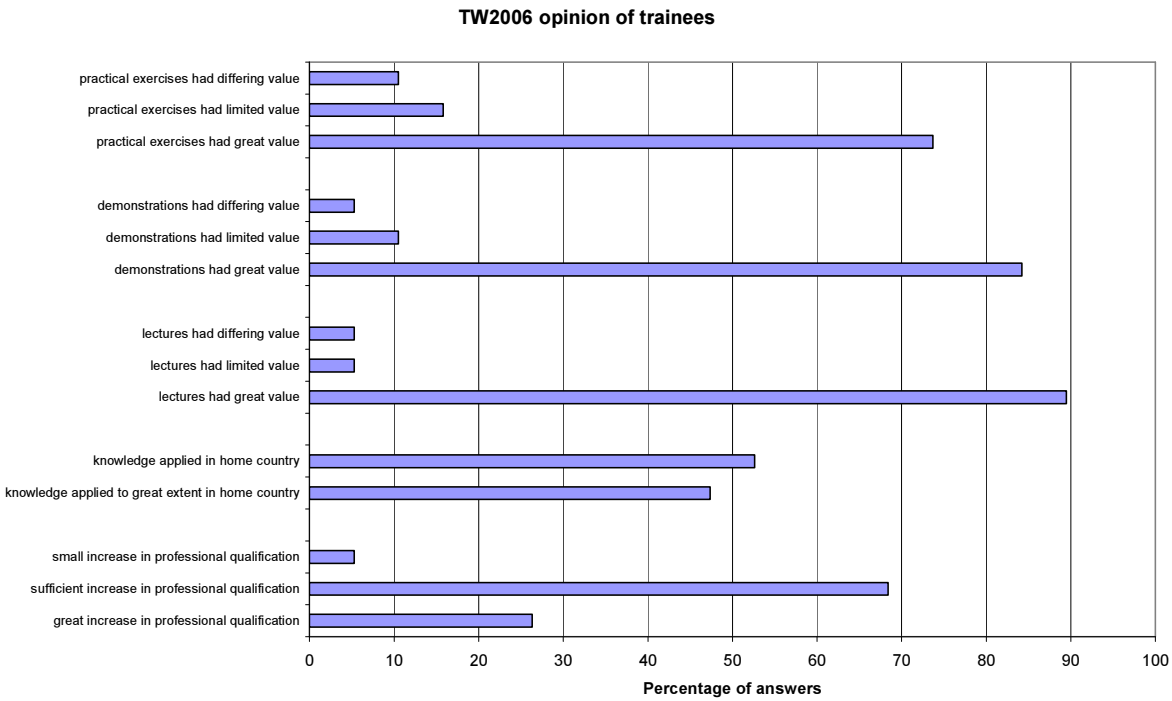
Dr. Ananstassiades leading a lab exercise

In addition to tackling a heavy workload during the day and "homework" in the evenings, the participants made good use of the opportunity to see some of the local sights and many of them visited Venice, Prague and Budapest, ably assisted by the IAEA's Ms. Ruby Cueto, to whom we all owe our gratitude for her organizational capabilities and dedication.

Initial feedback on the workshop from participants and lecturers alike has been very good and the organizing team are using the lessons learned and incorporating good suggestions into the programme for the next workshop, which is scheduled for September 2007. Some results from a final questionnaire completed by all participants are presented in the attached tables.


TW2006 opinion of trainees
too few participants
too many participants
adequate nr of participants
too heterogeneous professional background
adequate professional background
some poor language skills
adequate language skills
too many nr of countries represented
adequate nr of countries represented
0
10
20
30
40
50
60
70
80
90
100
Percentage of answers


Training Workshop 2006: opinion of trainees
duration too short
duration just right
duration too long
level too low
level just right
level too high
too narrow in scope
just right in scope
too wide in scope
the course was good
the course was excellent
0
10
20
30
40
50
60
70
80
90
100
Percentage of answers



Participants and staff of Training Workshop 2006

Forthcoming Events

26th Meeting of the Organization for Economic Cooperation and Development (OECD) Working Party on Nuclear Emergency Matters (WPNEM), OECD/Nuclear Energy Agency (NEA) Headquarters; Paris, France; 28-30 November 2006

Technical Officer: David H. Byron

A representative of the Joint Division will attend the forthcoming 26th Meeting of the OECD Working Party on Nuclear Emergency Matters at the OECD/NEA Headquarters in Paris, France, from 28-30 November 2006. It is anticipated that the meeting will discuss, among other issues, the INEX 3 Exercise and Workshop follow-up actions, strategies for nuclear emergency exercises, options for a new INEX series and ConvEx-3 (2008) and other inter-agency coordination activities.

Additional information on the Working Party on Nuclear Emergency Matters is available at www.nea.fr.

IPPC/CPM Technical Panel on Phytosanitary Treatments; IAEA Headquarters, Vienna, Austria; 4-8 December 2006

Technical Officer: David H. Byron

The International Plant Protection Convention (IPPC) is an international treaty relating to plant health, to which 157 governments (as of 14 August 2006) currently adhere. The Convention has been deposited with the Director-General of the Food and Agriculture Organization of the United Nations (FAO) since its initial adoption by the Conference of FAO at its Sixth Session in 1951.

The IPPC is an international treaty to secure action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control. It is governed by the Commission on Phytosanitary Measures (CPM) which adopts International Standards for Phytosanitary Measures (ISPM). The IPPC Secretariat coordinates the activities of the Convention and is hosted by FAO.

At the First Session of the Commission on Phytosanitary Measures held in Rome from 3-7 April 2006, the representative of the Food and Environmental subprogramme introduced a paper (CPM 2006/CRP/7) outlining the activities of the Joint Division related to phytosanitary applications of irradiation. It was noted (CPM-1 (2006)/Report, para. 49) that following the approval of Guidelines for the Use of Irradiation as a Phytosanitary Measure (ISPM No. 18) in 2003, the Joint Division continues to support scientific studies in response to Member State requests related to the application of irradiation as a quarantine treatment, especially in the context of the completion of Annex 1 (Specific Approved Treatments) of ISPM No. 18. The meeting was further informed that these studies are being undertaken on the basis of recommendations arising from a consultants meeting held in collaboration with the IPPC on the Use of Irradiation as a Quarantine Treatment (IAEA Headquarters, 10-14 May 2004).

As a result of these discussions, the CPM requested that the Technical Panel on Phytosanitary Treatments could consider developing Annex I of ISPM No. 18 in cooperation with IAEA (CPM-1 (2006)/Report, para. 82 and Appendix XII) as a high priority activity.

In consideration of the high priority given to this activity by the CPM and the IPPC Standards Committee, the Joint Division has agreed to the request of the IPPC Secretariat to host and finance developing country participation at the next meeting of the IPPC/CPM Technical Panel on Phytosanitary Treatments at IAEA Headquarters from 4-8 December 2006.

Additional information is available on the Food and Environmental Protection subprogramme website at http://www-naweb.iaea.org/nafa/fep/index.html.

Technical Meeting (TM) on Monitoring Radionuclides in Foodstuffs Traded Internationally; IAEA Headquarters, Vienna, Austria; 11-15 December 2006

Technical Officer: David H. Byron

The IAEA regularly receives requests from its Member States concerning technical cooperation in monitoring radionuclides in foodstuffs and it has implemented a number of such projects in various regions of the world. This suggests that the issue of monitoring radionuclides in foodstuffs remains of substantial international interest and needs further harmonisation. This is relevant with regard to the monitoring of foodstuffs produced and consumed locally and especially to international trade of food products in the light of the document "Measures to Strengthen International Cooperation in Nuclear, Radiation and Transport Safety and Waste Management, Radiological Criteria for Radionuclides in Commodities" (GOV/2004/54-GC(48)/8) and the recent revision by the Codex Alimentarius Commission of guideline levels for radionuclides in foods. In the current international safety standards, this issue is considered in a generic way, as

part of environmental monitoring, in the Safety Guide "Environmental and Source Monitoring for Purposes of Radiation Protection" (No. RS-G-1.8 (2005)).

However, specific guidance needs to be developed on the strategy for routine and emergency monitoring of radionuclides in foodstuffs, i.e., justification and optimisation of its extent, as well as data interpretation for purposes of radiation protection of the public. Prior to the development of such guidance, the Agency will hold the above mentioned TM to allow for an exchange of information on national practices of monitoring radionuclides in foodstuffs, both produced and consumed domestically and traded internationally. In order to integrate food monitoring programmes, radiation monitoring will be considered in comparison with monitoring of chemical and biological contaminants.

In view of the potential interest in the subject matter, a representative of the Joint Division will participate at the meeting to report on FAO activities in this area, especially as related to the recent adoption of the Codex Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade.

International Conference on Radiation Processing of Agro and Allied Products: Recent Trends and Future Prospects; Hyderabad, 9-10 February; and Delhi, India; 12-13 February 2007

Technical Officer: Tatiana Rubio-Cabello

The Food and Environmental Protection Section has been invited to participate at the Conference organized by the Indian Nuclear Society in conjunction with the Acharya NG Ranga Agricultural University in Hyderabad (9-10 February) and the Shriram Institute for Industrial Research in Delhi (12-13 February).

The Conference will cover developments in food irradiation technology; commercial irradiation facilities; design and engineering aspects of irradiation plants; design and adoption of electron beam facilities for food and agro products; synergy with complementary technologies; integrating packaging with food irradiation technology; economics and consumers aspects; forward and backward integration and linkages; national and international regulations; dosimetry protocols; and industry perspectives.

For more information, please contact Dr. Arun Sharma at: ksarun@apsara.barc.ernet.in.

Workshop on the Use of Irradiation as a Phytosanitary Treatment, 2007

Technical Officer: Tatiana Rubio-Cabello

Member States have increased their interest in using irradiation for phytosanitary applications during the last years, especially those applications related to quarantine measures.

The role of irradiation as a quarantine treatment of fresh fruits and vegetables was first evaluated internationally by a group of experts convened by FAO and IAEA in 1970. Although it was recognized at that time that irradiation was an effective quarantine treatment of such commodities, there was no economic incentive for using it commercially in view of the wide application of fumigation, especially using ethylene dibromide (EDB). However, because of health, environmental and occupation safety reasons, EDB was banned from production and use first by the U.S. Environmental Protection Agency in 1984, followed by most other countries. The ban on EDB had an adverse impact on trade in fresh fruits and vegetables worldwide but especially in some countries of the Latin American and Caribbean region. Methyl bromide (MB), the most widely used fumigant for food and agricultural products, including those for quarantine purposes, appears to be suffering the same fate as EDB and this fact can again produce a very negative impact on the economy of these countries.

The effectiveness of irradiation as a broad spectrum quarantine treatment of fresh fruits and vegetables was recognized by the North American Plant Protection Organization (NAPPO) in 1989, followed by other plant protection organizations (PPO), including other regional PPO's, such as Comite de Sanidad Vegetal del Cono Sur (COSAVE) and Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA), which operate under the International Plant Protection Convention (IPPC). In fact, this recognition was essential later (2001-2003), during the discussion and adoption of the ISPM No 18 "Guidelines for the Use of Irradiation as a Phytosanitary Treatment".

It is also important to note that in 1989, the Animal and Plant Health Inspection Service (APHIS), the USDA agency responsible for promulgating regulations dealing with quarantine treatments, published the first rule to allow the use of irradiation as a phytosanitary treatment. Later, APHIS decided to expand its regulatory framework to the approval doses for irradiation treatment of imported fruits and vegetables; the Final Rule came into effect in January 2006. By publication of these rules, the United States has made clear its acceptance of irradiation as a phytosaniatry/quarantine measure and this has produced an enormous interest in many Latin American and Caribbean countries to export irradiated fresh fruits and vegetables to USA. In fact, Mexico is building a new ir-

radiation facility for exporting fresh irradiated mangoes to the USA.

The Food and Environmental Protection Section, recognizing the importance of the use of irradiation as a quarantine treatment in this region, has decided to organize a regional workshop on this subject. The objective of the workshop is to provide up-to-date information on the use of irradiation as a quarantine treatment, to discuss its projection as well as future activities at the regional level.

The workshop will be oriented mainly to senior officials from the American region, who are responsible for policy and regulation in the area of phytosanitary measures for food, as well as quarantine officials, exporters and importers.

The date and place is to be determined soon, and the information will be disseminated through international, regional and national organizations.

Past Events

Workshop on Certification of Irradiation as a Phytosanitary Treatment for Fresh Fruits and Vegetables; Bangkok, Thailand; 14-16 June 2006

Technical Officer: Tatiana Rubio-Cabello

The approval and commercial adoption of irradiation as a quarantine treatment for agricultural commodities is gaining wide acceptance. The International Standards for Phytosanitary Measures (ISPM) No. 18: Guidelines for the Use of Irradiation as a Phytosanitary Measure as adopted by the Interim Commission on Phytosanitary Measures in April 2003 is currently put into practice by a number of countries.

Thailand is seeking United States market access for its tropical fruits and submitted the pest risk analyses for six of them (mangosteen, mango, litchi, longan, pineapple and rambutan) in February 2005 for US review and approval. Furthermore, the US and Thailand signed a Framework Equivalency Work Plan (FEWP) Agreement at the beginning of this year. Thailand has also prepared an Operational Work Plan which includes irradiation as the preferred phytosanitary treatment. Market entry for these fruits is expected to begin in 2007.

One of the biggest challenges facing the Thai Department of Agriculture or NPPO, as the certifying authority, is identifying several key activities, roles and responsibilities for establishment of an infrastructure for handling, processing and approving irradiated fruit and vegetables, for example, an evaluation and verification system, certification system, management system and safeguarding in order to cover issues needed by the NPPO of the United States.

In order to assist the national authorities in these tasks, a workshop on “Certification of Irradiation as a Phytosanitary Treatment for Fresh Fruits and Vegetables” was organized in June 2006. This workshop was the last activity implemented under the TC project THA5047 “Application of Food Irradiation for Sanitary and Phytosanitary Certification”.

The workshop was held at the Maruay Garden Hotel, Bangkok. The workshop was attended by 30 participants from different Departments and Offices of the Ministry of Agriculture and Cooperatives (Agriculture Regulatory Office, Plant Protection Research and Development Office, Centre for Export Inspection and Certification of Agricultural Products Post Harvest and Processing Research and Development Office, Agricultural Chemistry Section, Division of Agricultural Commodity and Food Standards Policy, Office of Commodity and System Standards Accreditation), Ministry of Public Health (Food Control Division Food and Drug Administration), Ministry of Science and Technology (Thai Irradiation Centre), universities and the private sector.

Participants of Workshop on Certification of Irradiation as a Phytosanitary Treatment for Fresh Fruits and Vegetables; Bangkok.

During the final day of the Workshop, the participants had the opportunity to evaluate the usefulness of the workshop and discuss the feasibility of implementing food irradiation technology as a quarantine treatment in Thailand, taking into account the quarantine problems to be solved in the country. As a result of this round table the participants agreed upon the following conclusions:

1. The participants obtained valuable knowledge on food irradiation technology with special emphasis on its use as a quarantine treatment.

2. The quarantine officials recognized the importance and effectiveness of irradiation as a wide spectrum quarantine treatment.
3. Specific training in this field at the national, regional and international level is urgently required.

Inter-Agency Committee for Response to Nuclear Accidents (IACRNA) – June 2006 Joint Plan Co-Sponsors Meeting; IAEA Headquarters, Vienna, Austria; 27-28 June 2006

Technical Officer: David H. Byron

The June 2006 Joint Plan Co-sponsors Meeting took place in Vienna from 27-28 June 2006 at the invitation of the IAEA/IACRNA Secretariat. Seventeen representatives from nine international organizations (FAO, IAEA, IMO, INTERPOL, OECD/NEA, OOSA, UNSCEAR, WHO and WMO) attended the meeting.

Among other activities, the Meeting reviewed comments and revised the Joint Radiation Emergency Management Plan of the International Organizations (JPLAN Edition 2006), accepted the International Maritime Organization (IMO) and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) as JPLAN co-sponsors, prepared a work plan for issuing the 2006 JPLAN edition, decided on Mexico as the host country for the 2008 ConvEx-3 exercise and conducted a tabletop exercise.

We are pleased to report the next 19th Regular Meeting of the IACRNA will be hosted by the FAO at its Headquarters in Rome, Italy, from 26-27 April 2007.

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

Meeting of the IUPAC Advisory Committee on Crop Protection; Awaji Island, Japan; 4-6 August 2006

Technical Officer: Ian Ferris

The international Union of Pure and Applied Chemistry (IUPAC) is best known for its work on harmonization (e.g., http://www-infocris.iaea.org/en/w3.exe$ShowRef?Ref=1721) and nomenclature (e.g., http://www.iupac.org/inchi/). However, IUPAC also sponsors activities in applied chemistry, including working groups affiliated with the Division of Chemistry and the Environment such as the Advisory Committee on Crop Protection. This committee currently comprises about 20 experts drawn from government, academia and industry. It aims at providing unbiased and authoritative views on the behaviour and potential impacts of agrochemicals in the environment through projects and technology transfer.

The 4-6 August 2006 committee meeting on Awaji Island, Japan showcased outputs from several projects including bioavailability of xenobiotics in the soil environment; impact of transgenic crops on use of agrochemicals and the environment; crop protection chemistry in Latin America; development of simplified methods and tools for ecological risk assessment of pesticides; glossary of terms related to pesticides; and, methods for setting MRLs for minor crops.

Several new activities and projects were discussed at the Committee meeting. These included a workshop on agrochemical regulation and harmonization (Beijing, 22-24 October 2007) and a possible 3rd IAEA/FAO/IUPAC regional workshop on pesticide management and enhancing laboratory capacity to be held in Africa (2007-9).

If you are interested in participating in an ongoing or proposed project, please visit the IUPAC project webpage for further details (http://www.iupac.org/divisions/VI/cp6.html).

11th IUPAC International Congress of Pesticide Chemistry; Kobe, Japan; 6-11 August 2006

Technical Officer: Ian Ferris

The IUPAC Congress of Pesticide Chemistry has been held every four years since 1974. The 11th IUPAC Congress was held on 6-11 August 2006 in Kobe, Japan. The scope and quality of the presentations made the 2006 Kobe Congress one of the best. Some 2000 participants attended the Congress, including 1250 scientists from 66 countries.

In the keynote addresses, James Collins, Vice President and General Manger of DuPont Crop Protection, argued that there is no one solution to the problems facing agriculture. Rather, chemical and biotechnological solutions are needed to meet the coming challenges, including diminishing per capital land, changing dietary habits, food safety concerns/terrorism and the dilemma between trade protection and economic growth. The business model he presented of science and technology meeting client's needs deserves consideration by all those committed to sustainable development. Professor Muri reminded the audience of the lives that were saved by DDT after the Second World War. At the same time, he urged participants to explore more benign means of pest control. FAO's Dr. S. Pandey's keynote address "What can we do to Eradicate Poverty and Hunger in the World" challenged all participants to put the UN Millennium Development Goals back on track. Jeffrey Barton noted the challenges facing agriculture and highlighted the need for internationally harmonized MRLs for specialty crops to

prevent trade barriers. James Seiber examined new dimensions in food safety, including quality expectations, and the wider range and availability of fruits and vegetables. Challenges include food-borne pathogens, concern about GMOs, and obesity. He highlighted recent advances in mass spectrometry, including the detection of *C. jeuni*, and the growing importance of mass spectrometry in monitoring contaminants.

The lunch-time seminars were a successful new initiative tested at the 11th IUPAC Congress. One of the seminars was sponsored by the FAO/IAEA Joint Division (see below for more detail).

Another new initiative at the Congress was the Kobe Gazette that published the daily highlights (http://www.iupac2006.jtbcom.co.jp/). If you haven't already done so, pencil in your calandars 4-8 July 2010 for the 12th IUPAC Congress (http://www.iupac.org/symposia/2010.html.

Lunch-time seminar on INFOCRIS and the IUPAC compendium of agrochemical information

The FAO/IAEA Joint Division sponsored a seminar at the 11th IUPAC International Congress of Pesticide Chemistry. The seminar dealt with giving easier access to information on agrochemicals using INFOCRIS. John Unsworth gave a general outline of information on agrochemicals available on the internet and stressed that care must be taken when using it. Ian Ferris then demonstrated the INFOCRIS database (http://www-infocris.iaea.org) which will give a comprehensive profile of the properties of agrochemicals. About 140 participants attended the seminar and feedback was very positive. Several agrochemical records were adopted, i.e. experts expressed their interest to enter data into the database. For more information, or if you would like to participate in this project, please contact John Unsworth (johnlydiaunsworth@compuserve.com.

2nd IAEA/FAO/IUPAC Workshop on Pesticide Management

The Joint Division has been working closely with IUPAC over the last decade on a wide range of projects of mutual interest, including in the sponsorship of the 2nd IAEA/FAO/IUPAC Workshop on Pesticide Management. Twenty participants from 13 countries attended the three-day workshop at INTEC, KAERI, Daejon, Republic of Korea from 14-16 August 2006. The venue and local organization were of the highest standard. This contributed significantly to a positive evaluation by the participants. The participation of Peter Buss (Sentek) and Elizabeth Carazo (University of Costa Rica) provided an opportunity to build on the achievements of the 1st IAEA/FAO/IUPAC Regional Workshop held in Costa Rica in 2005. The participation of James Dabrowski (CSIR) contributed a new approach to the monitoring and mitigation of pesticide problems and a link to possible future activities in Africa. Ron Parker (USEPA) contributed additional material to his new approach module on risk assessment as well as extensive materials on spray drift.

The workshop participants identified pesticide misuse, pesticide registration and lack of MRLs for specialty crops as the main regional problems. A barrier preventing food and agricultural exports is the difficulty of complying with international standards such as EUREPGAP.

Key unresolved issues identified at the workshop affecting international trade include harmonization of MRLs and regional harmonization of pesticide registration. The primary training needs identified included cost-effective analytical methods, quality management, the FAO/WHO pesticide specifications as well as the application and monitoring of GAP.

Main outputs from the workshop included a consolidated set of recommendations addressing regional pesticide issues and the presentations. They are available at the workshop site: (http://elearning.iaea.org/ATutor/bounce.php?course=70)

Workshop on New Trends in Food Irradiation; Daejong, Republic of Korea; 17-18 August 2006

Technical Officer: Tatiana Rubio-Cabello

The Food and Environmental Protection Section organized a National Workshop on “New trends on Food Irradiation” in conjunction with the Korean Atomic Energy Research Institute (KAERI), in Daejong, Korea from 17-18 August 2006.

The workshop was attended by more than 80 participants from different universities, research institutes, government and private organizations.

The workshop provided an overview on new developments in commercial applications of food irradiation and the status of regulations in different countries. However, the main highlight of the workshop was the potential for new research and development in this field. These included the use of irradiation as a quarantine treatment for fruits and vegetables, specifically for the mitigation of insects of the order Lepidoptera and Homoptera, and the tolerance of fruits to the use of irradiation along with other complimentary and supplementary technologies.

The workshop also highlighted the use of irradiation to improve food quality through modification of macromolecules, the importance of consumer education and dissemination of information on the use of electron-beams and X-rays for treatment of foods, particularly fruits and seafoods.

The workshop participants were briefed on the proposed IAEA Collaborating Centre for eLearning and acceler-

ated capacity building for food and environmental protection.

The workshop concluded with a panel discussion on the issues related to future research and development requirements.

The speakers at the Workshop also visited the Advanced Radiation Technology Institute (ARTI) in Jeongeup, located 150 km from Daejong. The objective of the visit was to analyze the infrastructure of the institute as the principal player addressing food irradiation under the proposed Collaborating Centre.

OIRSA Workshop; San Salvador, El Salvador; 31 August-1 September 2006

Technical Officer: Andrew Cannavan

Three regional experts in the field of veterinary drug residues - Dr. Gudrun Gallhoff from the European Commission, Dr. Richard Ellis from the the United States and Dr. Alfredo Montes Niño from Argentina - were sponsored by the Joint FAO/IAEA Programme to convene a workshop on veterinary drug registration and control during the IX Reunion de Jefes de Registro de Productos Veterinarios, Biologicos y Alimentos de Uso Animal in El Salvador, 31 August-1 September 2006. The workshop was organized by the International Regional Organization for Plant and Animal Health (OIRSA) and was attended by twelve representatives from Belize, Costa Rica, El Salvador, Honduras, Mexico, Nicaragua and Panama. The participants were professionals working within their respective departments with responsibility for veterinary drug registration, who had come together to promote harmonization of regulations in the region.

The programme structure, as suggested by Dr. Gudrun Gallhof of the European Commission, was adopted and implemented, and resulted in a proposal of the participants to their countries and to OIRSA to promote harmonization activities. The conclusions of the workshop were added to the general document produced in the previous regional harmonization activity.

The participants were very active during the presentations. Following the presentations of the regional experts, two working groups were formed to formulate and approve conclusions for the meeting.

The lecturers also presented to the participants several websites, including those of Codex, the European Union and the U.S. Food and Drug Administration, with information on regulations for veterinary drugs and the control of veterinary drug residues.

Consultants Meeting for the Coordinated Research Project (CRP) on Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Analysis; IAEA Marine Environment Laboratories, Monaco; 25-27 September 2006

Technical Officer: David H. Byron

A representative of the Food and Environmental Protection Subprogramme attended the Consultants Meeting on Applications of Radiotracer and Radioassay Technologies to Seafood Safety Risk Analysis at the IAEA Marine Environment Laboratories in Monaco from 25-27 September.

Radiotracer and radioassay nuclear techniques are particularly useful for generating information on the biokinetics and food-chain transfer of metals and toxins in marine organisms, including those that are valued as seafoods. The results of these studies could be better linked to analyses that support risk-based management decisions with respect to the safety assessment of commercially important seafoods intended for human consumption.

The broad objective of the CRP will be to generate data on priority contaminants in seafood organisms with regard to human consumption, sale and export, and to assess the application and relevance of these experimentally-derived and field-based data to the management of these contaminants in seafoods. The objective of the meeting was to review, revise and produce recommendations on the CRP proposal, as follows:

- The integration of current studies on the application of nuclear techniques to the study of the bioaccumulation and food chain transfer of contaminants in seafoods, with risk management decisions in relation to assessment of their suitability for human consumption;
- To more clearly identify the needs for scientific data on the bioaccumulation of priority contaminants in seafoods through linkages with international standardization bodies;
- To generate data that are relevant to the management of contaminants in seafoods through the application of radiotracer, radioassay and related nuclear technologies; and
- To prepare a list of laboratories/countries/experts in the different analytical areas (geographical and institutional representation) as potential participants in the CRP as agreement holders, research contract holders or technical contract holders.

Among the topics of discussion, a presentation was made by the reporting officer as to the ways and means to facilitate the further consideration of the CRP results within

international standardization (Codex) and expert (JECFA) bodies. This included the potential establishment of maximum levels through Codex for contaminants already evaluated by JECFA (lead, cadmium) as well as contaminants not evaluated to date (Harmful algal blooms (HABs), persistent organic pollutants (POPs) and other toxins). It was noted that this initiative would be undertaken on the basis of the presentations made, including international organization guidelines and procedures.

The science-based presentations highlighted the value of the applications of radioassay and radiotracer techniques to the study of the bioaccumulation and food-chain transfer of contaminants in seafoods, and the use of these data to underpin better exposure assessments as part of the risk analysis of contaminants in seafoods. The importance of selecting technically competent laboratories and contract holders from developing countries was stressed and in this regard, the consultants proposed potential CRP participants and laboratories.

The consultants agreed on the need to select and focus on specific contaminant/seafood combinations for those high value commodities encountering barriers to international trade. It was noted that this decision was based on the evidence that particular species bioaccumulate certain contaminants to very high levels.

The meeting made the following conclusions and recommendations:

Based on the scope of the CRP and the activities needed to attain the CRP objectives

Individual contract and agreement holders should:

- Focus on one contaminant category (algal toxins or toxic metals) representative of a major seafood commodity to make observations and measurements with respect to:
  a) Harmful algal bloom paralytic shellfish poisoning toxin (PSP) and ciguatoxin.
  b) Cadmium in oysters, scallops and cephalopods.
- Apply radiotracer and radio-assay techniques and use IAEA marine reference materials for quality assurance purposes;
- Undertake activities to directly support laboratories in the implementation of the CRP;
- Generate data on the basis of the Global Environment Monitoring System (GEMS/FOOD);
- Take account of Codex Risk Analysis Principles and Policy for Exposure Assessment of Contaminants and Toxins in Foods or Food Groups applied by the Codex Committee on Contaminants in Foods (www.codexalimentarius.net).

The IAEA should

- Establish and maintain a protected website for interaction among collaborators and provision of training materials and information.
- Include training sessions and explore possibilities of additional training opportunities through the TC programme.

Participating laboratories should have several of the following:

- Adequate funds for relevant research activities;
- A laboratory quality system in place (preferably according to ISO/IEC 17025;
- Receptor binding assay facility for algal toxins and/or radiotracer techniques and associated technologies;
- Internet access and capability/willingness to conduct training;
- Ongoing research programmes in the bioaccumulation of contaminants in marine organisms that are relevant to the following:
  - fisheries closures/re-openings;
  - specific aquaculture species and the geographical siting of aquaculture facilities, based on bioaccumulation characteristics of species and habitats;
  - risk-based assessments of contaminants in seafoods;
  - bioavailability of contaminants in seafood tissues to human consumers; and
  - other gaps in knowledge of contaminant bioaccumulation.

Specific related tasks include the preparation of a list of laboratories/countries/experts in the different analytical areas, while taking geographical and institutional representation into account, as potential participants in the CRP as agreement holders, research contract holders or technical contract holders. The consultants also identified the need for IAEA to provide marine reference materials for analytical quality assurance purposes in the measurement of toxic metals and considered that IAEA and FAO should facilitate the participation of contract holders in existing training opportunities through provision of information and active support of training applications through the TC programme.

The full report of the Consultants Meeting is available on the Food and Environmental Protection Subprogramme website.

21st Meeting of the Radiation Safety Standards Committee (RASSC), IAEA Headquarters, Vienna, Austria; 9-11 October 2006

Technical Officer: David H. Byron

A representative of the FAO attended the 21st Meeting of the RASSC to report that the revised *Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade* (CAC/GL 5-2006) were adopted as a final Codex text at the 29th Session of the Joint FAO/WHO Codex Alimentarius Commission in July 2006. It was noted that the Guideline Levels were revised to cover other radionuclides and to extend their application to long-term use. The RASSC was further informed that the scope of the text was clarified to indicate that the Guideline Levels only apply in situations related to nuclear or radiological emergencies (i.e. not routine monitoring purposes) and that the levels were separated into general and infant food categories.

The FAO representative also participated in discussions concerning the review and revision of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS), including in the finalization of a Document Preparation Profile for these revisions and the formulation of a joint statement by the BSS cosponsoring organizations for presentation at the next Twentieth Meeting of the Commission on Safety Standards (CSS), which was held at IAEA Headquarters from 21-22 November 2006.

The final report of the 21st RASSC will soon be available at http://www-ns.iaea.org/committees/default.asp.

Asia/Pacific Food Safety Summit; Singapore, 15-17 October; and Food Safety Seminar, Bangkok, Thailand; 18-19 October 2006

Technical Officer: Andrew Cannavan

These events were co-sponsored by Waters Corporation and the Joint FAO/IAEA Programme. The food safety meetings provided platforms for discussion on experiences, problems encountered, trends and methodologies related to the regulatory control of residues and contaminants in food. The programme at each event comprised a series of lectures on regulatory and analytical issues, open discussion and panel discussion sessions.

The meeting in Singapore had approximately 80 participants, with delegates from China, Indonesia, Japan, Korea, Malaysia, Philippines, Thailand, Taiwan, Singapore, the United Kingdom and the United States of America. Four keynote speakers introduced sessions on global food safety issues, legislative and regulatory requirements, analytical methodology and meeting challenges in food safety testing laboratories. Other participants gave presentations on various analytical methods, technologies, data handling and advances in screening techniques by mass spectrometry.

The seminar in Bangkok had approximately 120 participants, mainly from regulatory authorities and laboratories in Thailand. It was noteworthy that several of the participants were former trainees of the Agrochemicals Unit at Seibersdorf, and some participants were also collaborators with the Agency through Technical Cooperation Projects or as CRP contract holders. At this meeting, two keynote speakers gave presentations on global food safety issues and analytical methodology, followed by presentations on the same themes as those given in Singapore.

At each meeting, the Head of the Agrochemicals Unit, as representative of the co-sponsors, gave the first keynote address on global food safety issues and trends.

The Food Safety meetings provided an excellent opportunity for the dissemination of information on regulatory and technical aspects of food safety in Asia to targeted individuals with influence in this field. Co sponsorship of the events with Waters Corporation facilitated contact with a wider audience than would normally be achievable with internal funding.

Several good contacts were made and a basis for future collaborations in the region, both in research and in capacity building, was founded.

Status of Coordinated Research Projects

Quality Control of Pesticide Products; D5.40.03

Technical Officer: Josef Brodesser

The CRP dealing with analytical methods based on peer verified CIPAC and AOAC methods for pesticide formulation analysis is being closed. The overall aim of the CRP was the broadening of the scope and simplification of time and resource demands single component analytical methods, and to demonstrate the validity and equivalence of multi methods with commonly used single methods.

Following up the third Research Coordination Meeting in Myanmar in 2005 the multi-method approach investi-

gated in the CRP was to be verified by using real and synthetic formulation samples in interlaboratory comparison trials by the CRP participants. As soon as completed it is subject to final evaluation in regard to the applicability of multi-method approaches also in pesticide formulation analysis. It eventually will be compiled in the summary CRP report to be published in 2007.

Testing the Efficiency and Uncertainty of Sample Processing for Analysis of Food Contaminants; D6.10.23

Technical Officer: Josef Brodesser

The CRP work programme is in its final phase. The current research work focuses on new food commodities and new pesticides, as well as on the differences in the stability of active ingredients under cryogenic processing and ambient temperature. Particular attention is paid to large crop commodities where residue concentrations can vary considerably in one single crop, as well as between individual crops. Large crops are not yet covered sufficiently by commonly used sampling schemes as the inherent uncertainty of sampling seems to be underestimated considerably.

The final Research Coordination Meeting is planned to be held in Argentina in September/ October 2007.

Development of Strategies for the Effective Monitoring of Veterinary Drug Residues in Livestock and Livestock Products in Developing Countries; D3.20.23

Technical Officer: Andrew Cannavan

The fourth and final RCM for this CRP will be held at Munich Technical University, Germany, 27 November-1 December 2006. All research Contract and Agreement Holders were invited to attend. Contract Holders will be asked to present the results for their work over the period of the CRP and to produce a paper for publication in the IAEA Technical Document series in 2007.

Integrated analytical approaches to assess indicators of the effectiveness of pesticide management practices at a catchment scale; D5.20.35

Technical Officer: Britt Maestroni

The intent of the CRP is to bring together analytical laboratories with the required capabilities that, as members of wider groups, have a focus, or intention, to apply Good Agricultural Practices (GAP[1]) at a catchment scale and join the project to evaluate and optimize the effect of GAP on environmental sustainability as measured by the presence of selected high impact-ranking pesticides in surface water and sediments. Immediate benefits to individual groups include assistance from IAEA/FAO to improve laboratory competence for the specific requirements of the project and the opportunity to interact with groups working on comparable problems in different environments. Further benefits include the opportunity to establish quality-assured competence to evaluate indicators[2] of GAP performance by environmental monitoring at catchment scales and strengthening of multi- disciplinary/stakeholder groups. A consultants meeting, having the objectives of elaborating the protocols and activities for the CRP, took place in Vienna from 6-9 June 2006. Details can be found at the following link: http://www-naweb.iaea.org/nafa/fep/meetings/2006-ConsultantMeetingCRP.pdf.

A call for proposals for the above-mentioned Coordinated Research Project (CRP) on "Integrated analytical approaches to assess indicators of the effectiveness of pesticide management practices at a catchment scale" started in July 2006. The response was good and 24 research contract proposals and five research agreement proposals were received, of which ten research contracts and five research agreements will be awarded. The quality of the proposals was in general very good, and the selection criteria were quite strict, based on demonstrated experience in pesticide residue analysis availability of instruments at the analytical laboratory, i.e. GC-ECD/NPD(FPD) and preferably HPLC DAD/FLUO, GC/MS, a quality system in place (preferably according to ISO/IEC 17025), experience in residue analysis, linkages with GAP and watershed activities, capability to conduct field work, an ongoing water quality programme, adequate funds for monitoring activities, and internet access and capability/willingness to conduct training and undertake risk communication.

[1] see FAO website, http://www.fao.org/prods/GAP/archive/Development_of_GAP_Approach%20_FAO.ppt

[2] OECD (1999) Environmental indicators for agriculture Volume 1 Concepts and Framework (http://www1.oecd.org/agr/biodiversity/volume1.pdf).

Current Technical Cooperation Projects

Project Number	Title	Technical Officer
ANG5003	Veterinary Drug Residue Monitoring Programme	D. H. Byron & A. Cannavan
BEN5003	Veterinary Drug Residue Monitoring Programme	D. H. Byron & A. Cannavan
BGD5024	Developing Pesticide Residue Monitoring Capabilities in Support of Cash Crops	I.G. Ferris
BOL5015	Phytosanitary Treatment for Insect Pests Infesting Fresh Fruits & Vegetables	T. Rubio-Cabello
BKF5005	Regulatory Control and Monitoring of Contaminants and Residues	J. Brodesser & B. Maestroni
BRA5058	Applying Ionizing Radiation for Food Security and Health Care	T. Rubio-Cabello
CHI5022	Detection of Pesticide Levels in Water and Agricultural Soil Using Nuclear Techniques	I.G. Ferris
CHI5046	Certification of Exported Animal Products Using Nuclear & Other Analytical Techniques	D. H. Byron & A. Cannavan
CHI5048	Integrated Watershed Management for the Sustainability of Agricultural Lands	I.G. Ferris
COS5026	Management and Appropriate Use of Insecticide-nematicides	I.G. Ferris
CPR5016	Strengthening the Quality Assurance System for Food Irradiation	T. Rubio-Cabello
GUA5015	Establishing a Food Irradiation Plant	T. Rubio-Cabello
HAI5003	Enhancing Crop Productivity through the Application of Isotope Nuclear Techniques	I.G. Ferris
IVC5027	Monitoring of Pesticide Residues in Food Products	J. Brodesser & B. Maestroni
JAM5009	Developing Soil Fertility Management	I.G. Ferris
MAK5005	Upgrading of Food Safety System	J. Brodesser & B. Maestroni
MLI5018	Regulatory Control and Monitoring of Pesticides and Residues in Fresh Produce	J. Brodesser
MON5012	Monitoring of Residues in Livestock Products and Surveillance of Animal Diseases	A. Cannavan
MOR5024	Industrial Application of Irradiation	T. Rubio-Cabello
NIC5007	Determining Drug Residues in Bovine Meat Exports	D. H. Byron & A. Cannavan
NIR5030	Regulatory Control & Monitoring of Contaminants & Residues in Fresh Produce	J. Brodesser
NIR5033	Improvement of Quality Management and Food Safety Monitoring Using Isotope Techniques	J. Brodesser & D. H. Byron
PAN5015	Quality Assurance in Pesticide Residue Analysis for Agriculture Production	B. Maestroni & K. Gross-Helmert
PHI5030	Upgrading the Gamma Irradiation Facility	T. Rubio-Cabello
RER9074	Long-term Countermeasure Strategies and Monitoring of Human Exposure in Rural Areas Affected by the Chernobyl Accident	I.G. Ferris
ROK5034	Nutrient Efficient Crops and Safe Use of Pesticides in Sustainable Crop Production	I.G. Ferris

Project Number	Title	Technical Officer
SEN5027	Regulatory Control and Monitoring of Contaminants and Residues in Fresh Produce	J. Brodesser & D. H. Byron
SLO5002	Protecting Groundwater and Soil Against Pollutants Using Nuclear Techniques	I.G. Ferris
SRL5037	Assessing Impact of Pesticides on Water Catchments and Groundwater	J. Brodesser
SRL5039	Monitoring of Chemical Residues and Food-borne Pathogens	A. Cannavan
SYR5020	Implementation of Quality Assurance and Quality Control Procedures in Pesticide Residue Analysis Laboratories	J. Brodesser & D. H. Byron
YEM5005	Monitoring of Veterinary Drug Residues	A. Cannavan

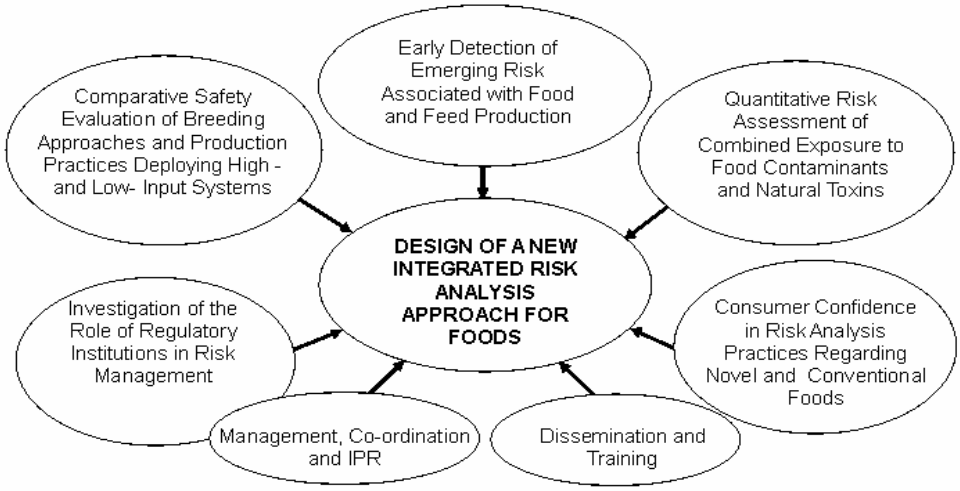
FAO/IAEA Agriculture & Biotechnology Laboratory, Seibersdorf

AOAC International Workshop on Foods to dye for-contaminants-sampling, analysis, legal limits; Limassol, Cyprus; 6-7 November 2006

Technical Officer: Britt Maestroni

The Europe Section of Association of Analytical Communities (AOAC) INTERNATIONAL organized an international workshop on "Foods to dye for-contaminants-sampling, analysis, legal limits" which took place in Limassol, Cyprus from 6-7 November 2006. About 80 participants took part in the event. Oral and poster presentations took place during the two days of the workshop.

Dr. Cnudde from Wageningen University presented an initiative called 'Safe Foods' (www.safefoods.nl), promoting food safety through a new risk analysis approach for foods. Recent food safety incidents and the introduction of genetically modified foods in Europe have resulted in an intense public debate regarding the safety of the European food supply, and consumers have little confidence in the safety of their food supply and little trust in the management procedures currently in place. The overall objective of the 'Safe Foods' model is to tackle food safety and strengthen consumer trust in the safety of food chain via improvements in the risk analysis approach. The overall programme consists of a number of interdisciplinary research projects, which should deliver the elements for the construction of the new risk analysis approach (see Figure this page). The development of a new risk analysis framework, including nutrition and labelling issues, is expected to result in improved consumer confidence in consumer protection activities across Europe.



Dr. Roger Wood from the Food Standards Agency, UK, discussed some of the issues of the SCOOP TASK, an EU initiative (http://ec.europa.eu/food/fs/scoop/9.1_fr_en.pdf) to investigate the relationship between the final analytical result, sampling, measurement uncertainty and the recovery factor used to obtain that result. At the present time there is no common interpretation of analytical results across the EU Community so significantly different results may be reported after analysis of the same sample. A sample for which there is a statutory limit of, for example, 4 µg/kg for a contaminant may be interpreted as containing 3 µg/kg on analysis in one Member State but 10 µg/kg in another. This is because some Member States correct analytical results for recovery, others do not; some Member States include measurement uncertainty in the interpretation of results, others do not. Thus it is essential that interpretation of analytical results is similar if there is to be equivalence across the EU; without it there can be no uniform interpretation of legislative standards.

Dr. Michael Thompson presented the concept of uncertainty of sampling. There are established procedures for sampling for most types of food, and because these procedures represent "best practices" we are all too likely to ignore the uncertainty introduced into the final result by sampling. Procedures for estimating uncertainty of sampling are in many ways analogous with procedures for analytical quality. Thus is it possible to conceive the idea of sampling bias and precision; in reality sampling bias is impracticable to address, sampling precision can be estimated as far as randomisation can be introduced in the sampling protocol.

Dr. Sune Eriksson, Lantmaennen analysis, Sweden, presented a lecture on the analysis of acrylamide in food, air and environmental samples. Acrylamide is a neurotoxic and carcinogenic substance demonstrated to occur in heated food products, with unexpectedly high levels in potato products (up to mg/kg level in potato crisps) and in beetroot. Since this problem came to light, a lot of effort has been invested in the development of accurate methods of analysis for acrylamide. Most of the methods are based on GC-MS or LC-MS/MS, with or without derivatization and most have detection limits of 1-30 µg/kg.

Dr. Richard Stadler, Nestle Product Technology Centre, Switzerland, presented the efforts of the food industry to address the issue of acrylamides. He introduced the CIAA Acrylamide working group (www.ciaa.be) which produced a socalled "toolbox" online, a collection of information on acrylamides ranging from agronomic to recipies, processing and final preparations for the food industry community.

Dr. Jean Marc Fremy, AFFSA, France, presented the state of art of mycotoxin analysis and the challenges for quality and reliability of results. He discussed EU regulation 466/2001 and 856/2005 which provide maximum limits for certain mycotoxins in certain foodstuff and EU regulation 406/2006 which lays down the methods of sampling and analysis for official control of the levels of mycotoxins in foodstuffs. The reason is that estimated results are dependent on the methods of analysis used, the sampling method, the measurement uncertainty, and the correction of recovery. During the following discussion it was stated that mycotoxins represent probably the most severe risk for food safety in developing countries and surveillance plans should be put in place to target the different toxins.

Dr. Bert Popping, President of AOAC Europe, Eurofins, UK, discussed food allergens and the EU labelling requirements for egg, milk, fish, shellfish, treenuts, peanut, wheat, soya, mustard, celery, sulphyte and sesame. Currently allergens are routinely checked by either PCR or ELISA assays. However many assays are not well characterised and they need validation. AOAC offers validation programmes (www.aoac.com).

Dr. Bert Popping, President of AOAC Europe

Dr. Jacqueline Van der Wielen, Dutch Food and Consumer Product Safety Authority, The Netherlands, made a bibliographical search on the potential to analyse allergens by LC-MS/MS. She compared ELISA, PCR and LC-MS/MS techniques.

Dr. Albrecht Siedel, Biochemical Institute for environmental carcinogens, Germany, discussed the analytical determination of polycylic aromatic hydrocarbons (PAH). These are carcinogenic compounds widespread in the environment and can occur in food products as a result of pyrolisis during cooking (i.e. grilling, deep frying) or smoke curing (fish, meat and cheese). Other PAH contaminated food groups are cereals, vegetables, vegetable oils, fruits, sea food, coffee and tea, whose contamination with PAH arises primarily from atmospheric deposition, roasting or drying processes. The two methodologies most commonly used are HPLC with fluorescence detection and GC-MS.

Dr. Glenn Kennedy, Agri-Food and Biosciences Institute, Veterinary Sciences Division, UK, discussed the case of nitrofuran antibiotics, in particular the banned compound furazolidone. In July 2004 residues of the stable furazolidone metabolite called AOZ were detected in poultry muscle from a major producer in Northen Ireland at a level that caused product recall, follow up investigations and notification in the rapid alert system in EU. The drug had been banned since the mid 1990s. Joint investigations showed that the drug had been administered to birds in their drinking water tanks. The drug had sedimented on the bottom of the tanks, and when a new effervescent cleaning product was used the old drug became available. All water tanks in the organization were changed and a positive release scheme was implemented. This colourful case study showed the efficiency of the national control laboratories in immediately detecting through its regular monitoring programme of non-compliant samples.

Dr. Katrin Hoenicke, Eurofins, Germany, presented the analytical challenges in detecting low amounts of sudan dyes in food and oleoresins. Sudan dyes are a family of inexpensive and readily available compounds commonly used for the coloration of mineral oils, wax products (i.e. candles), and ball-point inks. No use is allowed in food products, though they can be used fraudulently to intensify the colors of bell peppers and chilli powders. Their degradation products are considered to be carcinogenic

and teratogenic. The speaker presented some cases were oleoresins were found positive for sudan dyes. However, there was a case of cross contamination from lubricants that were used for greasing within the extraction plant, and in another case cross contamination was identified from red bags used for transport, drying and storage of whole paprika pods. The detection technique was by LC-MS/MS, and the LOQ was 10-100 ppb.

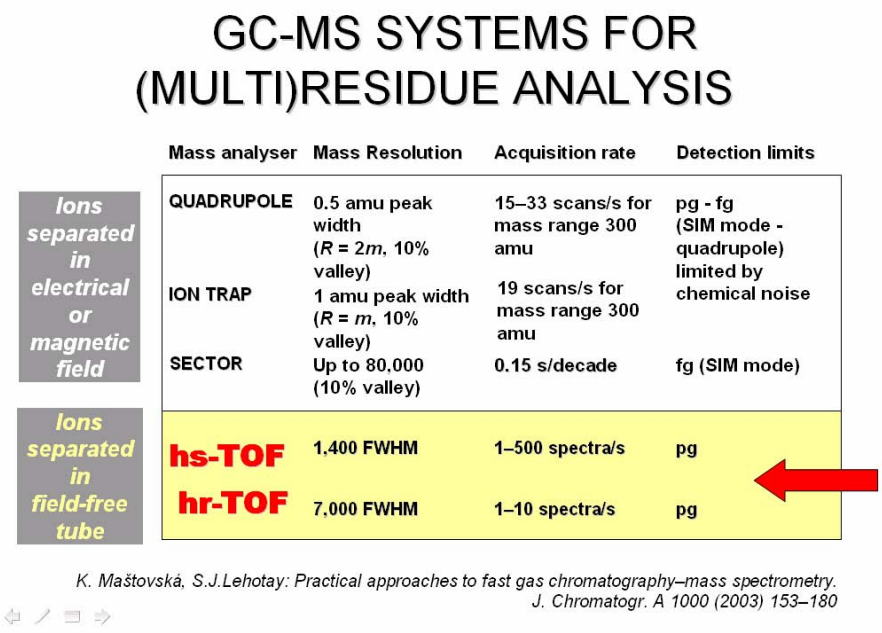
Prof. Jana Hajslova, Institute of Chemical Technology, Czech Republic, presented a lecture on GCxGC-TOFMS, and reassured the audience on the effectiveness of detection systems as to the requirements of the baby foods directive in Europe. Prof. Hajslova showed the current possibilities of GC-MS systems for multiresidue analysis in food.

Prof. Hajslova presented the comprehensive two dimensional gas chromatography (GCxGC) as a substantial innovation in terms of enhanced separation power. In GCxGC, two GC separations are applied for the characterization of a sample. In most cases the separation starts on a non-polar narrow bore capillary column, and trough a modulator, the fractions of eluents are released into a short polar or selective microbore capillary colum, where "flash separations" occur.

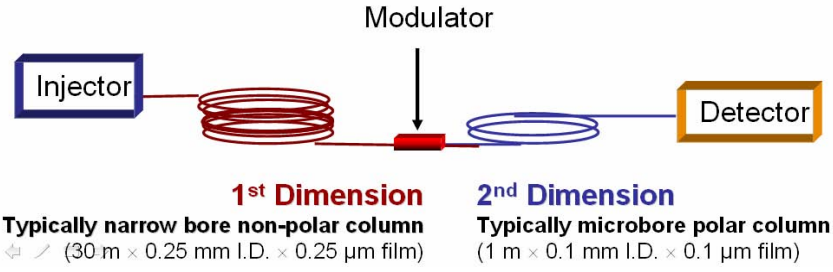
Since the separation on the second column is very fast, the second dimension peaks are very narrow, and this requires detectors with extremely fast acquisition. An example is high-speed time of flight (HS-TOF), which allows collection of data at acquisition rates up to 500 spectra/s, which is sufficient for reconstruction of very narrow peaks such as those from GCxGC

Dr. Stella Michaelidou, Pesticide Residues Lab, State General Laboratory, Cyprus, presented a lecture on the impact of pesticides on childrens' health. Children from the prenatal period through adolescence have special vulnerabilities to pesticides and are very different from adults in terms of the ability to metabolize, detoxify, and excrete toxins. Of particular concern is the potential effects of pesticides which are endocrine disrupters, especially when exposure occurs during "critical windows of development". The question addressed was: are MRLs toxicologically safe also for toddlers and infants? Acute short-term exposure is of concern and recently the safety of MRLs for certain pesticides, i.e. aldicarb, was questioned at the EU level.

Dr. Nikolaos Thomaidis, Laboratory of Analytical Chemistry, University of Athens, Greece, discussed seafood consumption as a route of exposure to organotin compounds in Greece. Organotins are a class of compounds used as PVC stabilizers, preservatives in wood, textiles, plastics, antifouling paints. They reach humans primarily through ingestion of contaminated fish and fish products. Little is known of the effects in humans and there is a need for more accurate food consumption data in order to refine the risk assessment and the current EU legislation, which sets a tolerable daily intake (TDI) of 0.25 µg/kg/bw/day for the sum of dibutyltin, tributyltin, triphenyltin and dioctyltin.



K. Maštovská, S.J.Lehotay: Practical approaches to fast gas chromatography–mass spectrometry. J. Chromatogr. A 1000 (2003) 153–180



The workshop was a good opportunity to meet new people and investigate possible cooperation on food safety projects. In addition the workshop represented an opportunity to visit the Curium Theatre site near Limassol.

Comparison of sample processing methods for analyzing pesticided residues in soil

Technical Officers: G. Suszter, M. Schweikert Turcu and P.M. Klaus

The poster "Comparison of sample processing methods for analysing pesticide residues in soil" (G. Suszter, A. Ambrus, M. Schweikert Turcu and P.M. Klaus) was pre-

sented at the IUPAC conference in Kobe (Japan), 3-6 June 2006.

The work elaborates the 'sample constant' approach for characterization and comparison of the efficiency of different laboratory procedures, such as sample preparation, sample processing and sample size.

The calculations were applied to data obtained during extensive studies carried out in the Agrochemicals Unit in previous years. The studies aimed to elaborate new analytical methods for multiresidue analysis of pesticides in soil samples, taking into consideration the wide application of the methodology, significant cost reductions and environmental protection measures.

Influence of climate change on the environmental behaviour of s-metolachlor in a soil-plant-water system

Technical Officer: Mariana Schweikert Turcu

A poster entitled "Influence of climate change on the environmental behaviour of s-metolachlor in a soil-plant-water system" (B. Wimmer, E. Kaltenbrunner, M. Schweikert Turcu, F. Strebl) was presented at the workshop on "Lysimeters for Global Change Research: Biological Processes and the Environmental Fate of Pollutants" from 4-6 October 2006 at the campus of the GSF-National Research Center for Environment and Health in Neuherberg, Germany. The poster reflected the results from a collaborative project between the Agrochemicals Unit and the Department of Agricultural Research of the Seibersdorf Austrian Research Centre.

The experimental design, using monolith lysimeters, facilitated an investigation into the effect of climate warming changes anticipated by many scientists on the behaviour of pesticides in the environment. Simulated increased temperature (+3˚C) and higher precipitation intensities in fewer irrigation events positively influenced soy plant germination and growth, but no significant effect was observed on pesticide leaching and degradation rates in soil.

Adaptation of the IAEA-ethyl acetate multi residue method to determine pesticide residues in wheat flour

Technical Officer: Perihan Aysal

The validation of the multiresidue pesticide method reported in the previous edition of this newsletter has been completed and the method was presented as a paper by Ms. Perihan Aysal at the ANCAP-SETAC International Conference on Pesticide Use in Developing Countries: Environmental Fate, Effects and Public Health Implications, held from 16-20 October 2006 at the Arusha International Conference Centre, in Arusha, Tanzania. Mr. Gaspar Mushi, a Tanzanian Fellow who worked on the method during his training period in the Agrochemicals Unit and co-authored the paper, also attended the conference.

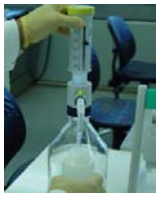
The modified procedure was briefly described in the previous issue and is outlined below.

The method was validated by analysing wheat flour samples spiked with 24 pesticides at levels between 0.03 and 3 mg/kg. The recoveries of individual compounds are illustrated in Figure 1 and the average recoveries for 0.03, 0.3 and 3 mg/kg fortification levels for the pesticides selected are shown in Table 1 (see page 22). Typical recovery of the method, at all levels and for 23 analytes in wheat flour was 94% with a relative standard deviation of 9% (n=412). Coumaphos determination at the level of 0.03 mg/kg was compromised by an interfering peak from the matrix, but the method performance for this compound at higher fortification levels was satisfactory. The method is simple and robust and is suitable for application in food safety regulatory laboratories both in developed and developing countries.

The IAEA- Ethyl acetate method to determine pesticide residues in wheat flour

Extraction

Step 1: Add 20 ml water to 20 g flour sample, mix:

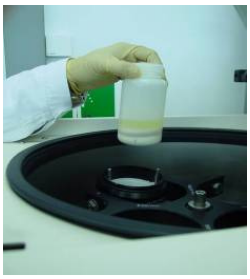



Step 2: Add 10 g NaHCO3, mix:

Step 3: Add 40 ml ethyl acetate and warm up the mixture to 35°C, 5 min, with stirring:

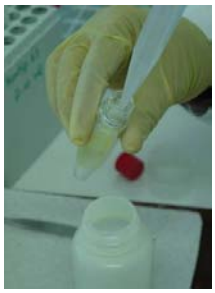

Step 4: Add 20 g Na2SO4 and homogenise with ultra turrax, 1 min:

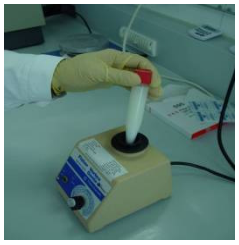
Step 5: Centrifugation at 2500 rpm, 2 min:



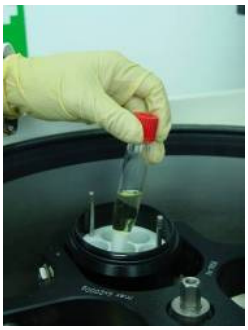
Clean-up of raw ethyl acetate extracts

Step 1: Add 10 ml of extract to PSA + anhydrous $MgSO_4$ and vortex 45 sec.:





Step 2: Centrifugation at 1900 rpm, 1 min



Step 3: Transfer the final extracts to auto sampler vial and analyse by GC-ECD and NPD/MS

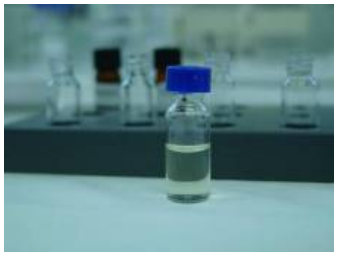


Table 1: Overview of some method validation characteristics

	Accuracy		Precision	
Fortication level	**Recovery %**	**Codex acceptable ranges**	**Repeatability, CV_A%**	**Codex acceptable ranges**
0.03 mg/kg	95	70-120	10	20
0.3 mg/kg	95	70-120	9	15
3 mg/kg	94	10-110	8	10

FAO funded trainees

Two scientists, Ms. Hafidha Idir and Mr. Abdel-Nacer Zahi, from the Algerian National Institute for Veterinary Medicine, Algiers, were trained in the Agrochemicals Unit from 12 June to 7 July 2006, with funding provided under an FAO Technical Cooperation Project.

In the first part of the training (weeks 1-2), the trainees worked on a study to elaborate the performance characteristics of the IAEA-ethyl acetate multiresidue pesticide method in melon. Comminuted melon samples were fortified at 0.03, 0.3 and 3 mg/kg fortification levels with the following 24 representative pesticides: dichlorvos, EPTC, heptenophos, propachlor, dimethoate, diazinon, pirimicarb, vinclozolin, chlorpyrifos-ethyl, parathion-methyl, chlorfenvinphos, methidation, triazophos, propyconazole, fenpropathrin, iprodion, azinphos-methyl, fenarimol, coumaphos, fenvalerate, lindane, alpha-endosulfane, metalaxyl, and malathion.

For a quick review of the method performance and to evaluate the individual analysis steps during method adaptation, ^{14}C-Chlorpyrifos was also applied at all fortificaton levels. (See Table 1, page 22.)

The trainees were able to use this study to gain experiene in basic maintenance of GC instruments and the evaluation of GC chromatograms, as well as the application of gas chromatography-mass spectrometry (GC-MS) as a confirmatory method and qualification in GC-MS systems by using ion spectra of some compounds.

Table 1: ^{14}C-Chlorpyrifos recoveries (Q) and repeatabilities (as RSD) at different levels related to each step of the method

Fortication level, mg/kg	Extraction		Clean-up		Total	
	Q, %	RSD, %	Q, %	RSD, %	Q, %	RSD, %
0.03	94	2.0	93	2.6	87	2.0
0.3	92	1.5	95	1.8	87	2.7
3	89	1.0	94	5.9	83	5.9

In the second part (weeks 3-4), the trainees gained experience on HPLC including column installation, mobile phase preparation, starting up analysis, system suitability test, related calculations and introduction to QA/QC measures and also practical work done on these subjects

Tetracycline analyses were performed by using HPLC. Before the analysis explanations were given on preparation of stock solutions, intermediate solutions, working mixture and use of calibration templates

Perihan Aysal with FAO trainees

Mr. Mohammad NasirRathr with trainees

Liquid chromatography-tandem mass spectrometry (LC-MSMS) method for sulphonamides

Technical Officer: Marivil Islam

The sulphonamides are amongst the most widely used antimicrobial drugs in food-producing animals, both therapeutically and at sub-therapeutic levels as growth promoters. Codex and other National and Regional bodies have set maximum residue levels for these substances in various animal tissues

Earlier this year, a full method validation was completed, with the help of two Fellows from Montenegro and a consultant from Brazil, on an HPLC method for the quantitation of seven sulphonamide antibiotics in animal tissues. This method has now been further developed as a confirmatory method using liquid chromatography-tandem mass spectrometry (LC-MSMS). The method meets the identification criteria specified by the European Union in Commission Decision 2002/657/EC, and included in the draft revised Codex guidelines, for confirmatory methods for compounds licensed for use in food-producing animals.

One advantage of LC-MSMS, apart from the high sensitivity and specificity of the technique, is the possibility of significantly reducing run times because individual analytes do not always need to be chromatographically resolved. To illustrate this, Figure 1 (see page 23) shows a chromatogram of seven sulphonamides at a concentration of 1 ng/µl, generated using the previously validated HPLC method with post-column derivatisation and UV detection. The peaks are all well resolved in a run time of approximately 20 minutes, facilitating accurate peak area measurement for quantitation. Figure 2 (see page 23) shows multiple reaction monitoring chromatograms for the same seven sulphonamides run by LC-MSMS. Because the mass spectrometer measures the characteristic ions of each analyte separately, there is no need for chromatographic baseline resolution, allowing a much shorter run time (about 7 minutes), achieved using a shorter analytical column with a narrower bore and a reduced mobile-phase flow, thereby reducing solvent and reagent usage. The system also allows the measurement of two characteristic daughter ions generated from the primary ion for each compound, the ratios of which can be measured, thus fulfilling the above mentioned identification requirements for confirmatory methods.

Work is currently under way to extend the scope of the confirmatory method to include more members of the sulphonamide class of drugs. The method will then be validated and made available to Member State laboratories.

Figure 1: HPLC-UV chromatogram of seven sulphamides

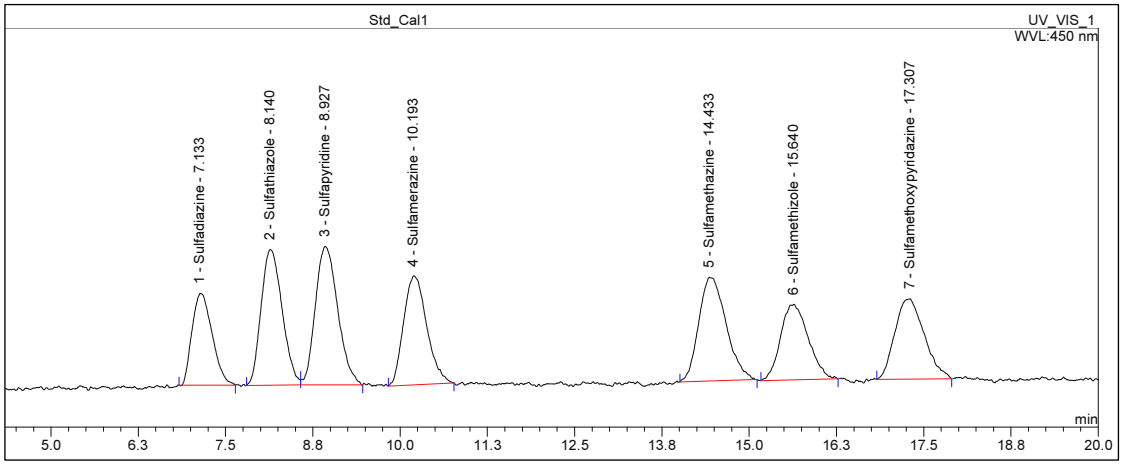
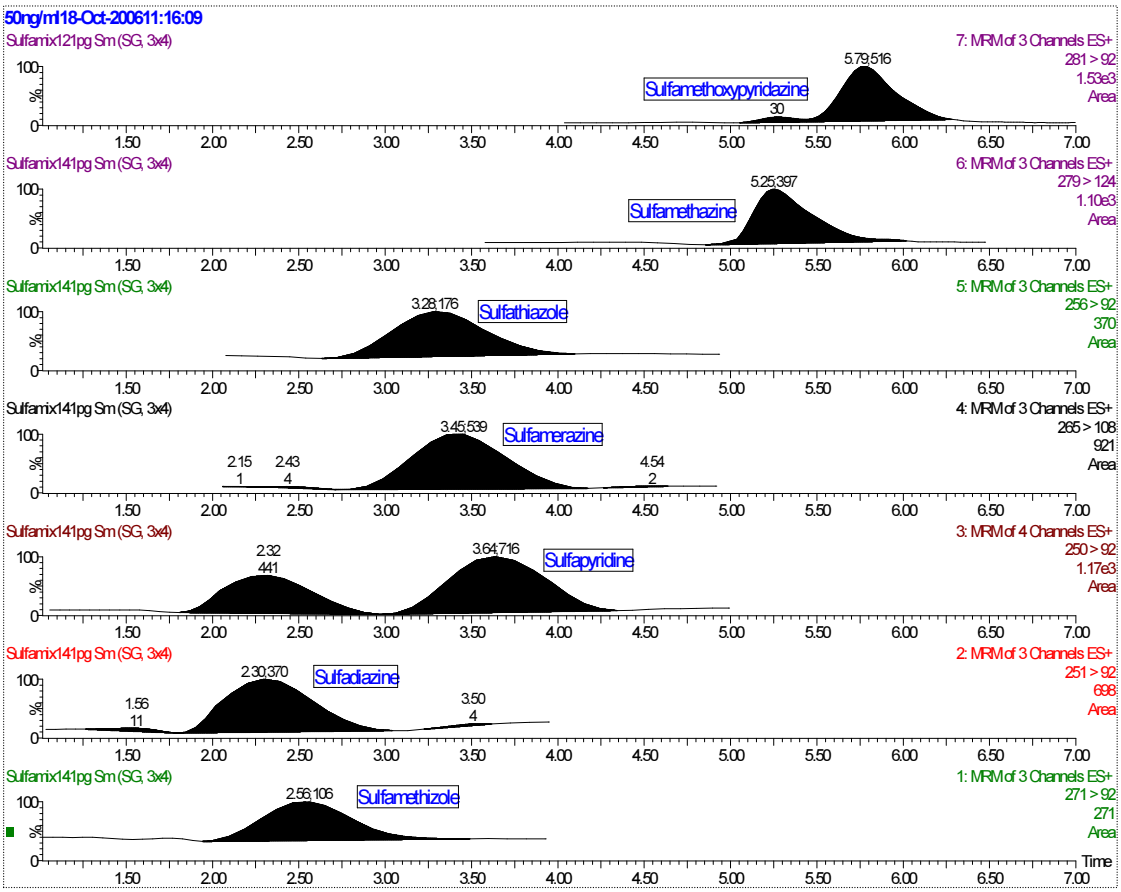


Figure 2: LC-MSMS MRM chromatograms of seven sulphonamides a 1 ng/ µl



Other Associated Meetings

29th Session of the Joint FAO/WHO Codex Alimentarius Commission; Geneva, Switzerland, 3-7 July 2006

Technical Officer: David H. Byron

The Joint FAO/WHO Codex Alimentarius Commission held its 29th Session at the International Conference Centre in Geneva, Switzerland from 3-7 July 2006. The Session was attended by 376 delegates, alternates and advisors from 110 Members countries and 59 international governmental and non-governmental organizations, including UN agencies. The session was opened by Dr. Kraisid Tontisirin, Director, Nutrition and Consumer Protection Division, Agriculture, Biosecurity, Nutrition and Consumer Protection Department, FAO and Ms. Weber-Mosdorf, Assistant Director-General, Sustainable Development and Healthy Environments, WHO

A representative of the Joint Division attended the Commission meeting to help ensure final adoption of the revised *Codex Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade* and to report on other matters arising from the Food and Environmental Subprogramme of interest to Codex.

Statement on Activities of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture Relevant to Codex Work

In addition to those activities of the Food and Environmental Subprogramme presented under document CAC/29 INF/6 (*Information Paper on Activities of the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture Relevant to Codex Work*), the representative of the Joint Division also informed the Commission of other subprogramme activities (ALINORM 06/29/41, paras. 206-208), including:

- Consultants Meeting on the IAEA Coordinated Research Project on the Application of Radiotracer and Radioassy Technologies to Seafood Safety Risk Assessment (IAEA Marine Environment Laboratory, Monaco, 25-27 September 2006);
- Hosting of the 1st Technical Panel on Phytosanitary Treatments under the International Plant Protection

Convention Commission on Phytosanitary Measures (IAEA Headquarters, Vienna, 4-8 December 2006); and

- Inter-Regional Seibersdorf Training Course for Developing Countries on Screening and Confirmatory Methodologies for the Analysis of Veterinary Drug Residues (Seibersdorf, Austria, September/October 2007).

The Commission expressed its thanks to the Representative of the IAEA for the useful information provided at the present session and their continued cooperation with the Codex Alimentarius Commission.

Final Adoption of the Revised Codex Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade

The 38th Session of the Codex Committee on Food Additives and Contaminants (April 2006) forwarded the revised Codex Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade to the 29th Session of the Codex Alimentarius Commission for adoption at Step 5/8 (with the omission of Steps 6 and 7) and inclusion in the Codex General Standard for Contaminants and Toxins in Foods (ALINORM 06/29/12, paras. 195-198).

The revised Codex Guideline Levels for Radionuclides in Foods Contaminated Following a Nuclear or Radiological Emergency for Use in International Trade (ALINORM 06/29/12, Appendix XXXI) were adopted by the 29th Session of the Joint FAO/WHO Codex Alimentarius Commission as a final Codex text (ALINORM 06/29/41, paras. 63-66 and Appendix IV, Part 2). It is anticipated that the revised Codex Guideline Levels (CAC/GL 5-2006) will be published by the Codex Secretariat in the near future.

Further Consideration of Food Irradiation under Codex

The Commission agreed that the responsibility for considering food irradiation should be transferred to the Codex Committee on Food Hygiene and adopted the amendment to point g) of its terms of reference as proposed (ALINORM 06/29/41, para. 27)

FAO and WHO Expert Consultation on the Health Risks Associated with Methylmercury and Dioxins and Dioxin-Like Polychlorinated Biphenyls (PCBs) in Fish and the Health Benefits of Fish Consumption

The Commission agreed (ALINORM 06/29/41, para. 195) to request FAO/WHO to consider convening an expert consultation on the health risks associated with the consumption of fish and other seafood and the health benefits of fish and other seafood consumption, with the detailed terms of reference as proposed by the Codex Committee on Food Additives and Contaminants (ALINORM 06/29/12, paras. 189-194), as follows:

<u>Assessment of the health risks associated with the consumption of fish and other seafood</u>

- To identify and to consider contaminants of possible concern present in fish (methylmercury and dioxins and dioxin-like PCBs);
- To describe the pattern of contamination of the different contaminants in the relevant fish species/fish groups, such as predatory fish, oily fish, etc.;
- To identify vulnerable groups of the population who might be at higher risk than the average consumer (e.g. infants, young children, pregnant women, high consumers); and
- To provide guidance to countries on ways to identify regions where people are more likely to be exposed to high levels of contaminants because of differences in nutritional behaviour or local contamination.

<u>Assessment of the health benefits of fish and other seafood consumption</u>

- To consider and review the evidence on the beneficial nutritional factors of eating fish (e.g. as a source of protein and essential nutrients such as vitamin D, iodine and omega-3 fatty acids).

<u>Comparison of the health risks and health benefits of fish and other seafood consumption</u>

- To develop a methodology and identify the data necessary for carrying out quantitative assessments of risks and benefits related to fish and other seafood consumption.
- To compare nutritional benefits against the possibility of adverse effects, including the uncertainties, taking into consideration all groups in the population and, if possible, allowing quantitative comparisons of human health risks and benefits of fish and other seafood consumption.

Antimicrobial Resistance

The Commission agreed to establish a Codex *Ad Hoc* Intergovernmental Task Force on Antimicrobial Resistance (ALINORM 06/29/41, paras. 164-169 and Appendix XI) and agreed on its objectives, terms of reference and timeline, as follows:

<u>Objectives</u>

To develop science based guidance, taking full account of its risk analysis principles and the work and standards of other relevant international Organizations, such as FAO, WHO and OIE. The intent of this guidance is to assess the risks to human health associated with the presence in food and feed including aquaculture and the transmission

through food and feed of antimicrobial resistant micro-organisms and antimicrobial resistance genes and to develop appropriate risk management advice based on that assessment to reduce such risk.

Terms of Reference

To develop guidance on methodology and processes for risk assessment, its application to the antimicrobials used in human and veterinary medicine as provided by FAO/WHO through Joint FAO/WHO Meeting on Microbiological Risk Assessment (JEMRA), and in close co-operation with OIE, with subsequent consideration of risk management options. In this process work undertaken in this field at national, regional and international levels should be taken into account.

Timeframe

The Task Force shall complete its work within four sessions, starting 2007.

The full report (ALINORM 06/29/41) of the 29th Session of the Joint FAO/WHO Codex Alimentarius Commission is available at ftp://ftp.fao.org/codex/Alinorm06/al29_41e.pdf

eLearning

New eLearning Courses

Technical Officer: Kerstin Gross-Helmert

Two new eLearning courses have recently been launched under http://elearning.iaea.org/

1. The **Conformity Assessment Introduction course** gives an introduction to conformity assessment in analytical laboratories. It comprises information on:

- the concepts of conformity assessment, quality assurance, quality control and quality systems;
- reasons and requirements to implement Quality Systems;
- the importance of independent verification of conformity; and
- the formal quality assurance standards GLP, ISO 9000 series and ISO 17025.

2. The **Documentation of Laboratory Work course** includes topics on

- the importance of documentation for analytical laboratories;
- preparation of study plans, Standard Operating Procedures and final reports; and
- document maintenance.

Other eLearning courses available on the system are:

- Pesticide residue analysis
- Pesticide management
- Laboratory pre-requisites
- Basics of radiotracer use
- Handling pipettes and syringes
- Statistics manual
- Project management
- Time management

The **eLearning courses are free** and anyone can join, at any time. The system tracks students' progress thus saving valuable connection time. If you haven't already done so, **register now:** (http://elearning.iaea.org/ATutor/registration.php).

Publications

Wesongah, J., Murilla, G., Guantai, A.; Elliott, C., Fodey, T. and Cannavan, A. (2006). A competitive enzyme-linked immunosorbent assay for determination of chloramphenicol. Journal of Veterinary Pharmacology and Therapeutics, *in press.*

Aysal, P., Mushi, G. and Cannavan, A. (2006). Adaptation of the IAEA-ethyl acetate multiresidue method to determine pesticide residues in wheat flour. Book of abstracts of the International Conference on Pesticide Use in Developing Countries: Environmental Fate, Effects and Public Health Implications, 16-20 October 2006, Arusha, Tanzania.'

TECDOC – 1530; Use of Irradiation to Ensure the Hygienic Quality of Fresh, Pre-cut Fruits and Vegetables and other Minimally Processed Food of Plant Origin; D6.10.22

Sales and consumption of fresh pre-cut and minimally processed fruits and vegetables continue to grow. Changes occurring in life and eating styles, as well as demographic changes, have been cited as one of the reasons for the increasing demand for this type of produce.

Since fresh fruits and vegetables are grown, processed or packaged in areas that may be exposed to microbial pathogen contamination, there is an increasing concern that these products may harbour microbial pathogens. In fact, a number of outbreaks linked to the consumption of contaminated fresh pre-cut fruits and vegetables have been reported. Prior to this Coordinated Research Project, studies on various chemical and physical methods of decontamination for their efficacy in destroying pathogens have been made. The use of ionizing radiation seems to have several advantages in relation to other alternative treatments, however more research was needed in order to demonstrate its efficacy without producing negative effects in the physiological traits of the fruit, and thus the commercial quality of these products.

The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture initiated in 2001 a Coordinated Research Project (CRP) on the "Use of Irradiation to Ensure Hygienic Quality of Fresh, Pre-cut Fruits and Vegetables and other Minimally Processed Food of Plant Origin". This TECDOC includes the results of this CRP. The results contain data on the effect of ionizing radiation as a preservation method in more than 40 different produce and more than 12 pathogenic bacteria.

Irradiation proved to be an excellent process to improve the hygienic conditions and safety of fresh, pre-cut fruits and vegetables and other minimally processed food of plant origin. The doses applied for these purposes also extended the shelf-life of most of the produce studied.

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