



# Food & Environmental Protection Newsletter

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Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and FAO/IAEA Agriculture and Biotechnology Laboratory, Seibersdorf

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## To the Reader

I am pleased to announce that on 1 July 2004, Dr. Andrew Cannavan was appointed as Head of the Agrochemicals Unit at the FAO/IAEA Agriculture and Biotechnology Laboratory at Seibersdorf. Specific details of Dr. Cannavan's employment history, including his previous duties as technical officer with the Animal Production and Health Section of the FAO/IAEA Joint Division of Nuclear Techniques in Food and Agriculture, are contained in the *Staff Changes* section of this Newsletter.

This issue of our Newsletter also contains a *Feature Article* on our participation at the FAO/WHO Global Forum of Food Safety Regulators – Building Effective Food Safety Systems in Bangkok, Thailand from 12-14 October 2004. Similar to the First FAO/WHO Global Forum of Food Safety Regulators held in Morocco in January 2002, this Second Global Forum provided the opportunity for food safety regulators from all regions of the world to meet together to consider,



**IAEA**  
International Atomic Energy Agency

discuss and share experiences on food safety issues of concern. The Global Forum was attended by almost 400 participants from over 90 countries and 10 international governmental and non-governmental organizations. The Global Forum presented an excellent opportunity for the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture to report on its food safety and food control activities and to highlight its collaborative efforts in preparedness and response to nuclear emergencies affecting agriculture, including the application of appropriate agricultural countermeasures.

This international meeting also provided the opportunity to address one of the recommendations arising from the Working Group Meeting on the International Consultative Group on Food Irradiation (ICGFI) by convening a Seminar on the Application of Irradiation for Sanitary and Phytosanitary Purposes immediately prior to the Global Forum on 11 October 2004. The Joint FAO/IAEA/WHO Seminar was attended by over 30 participants from 11 IAEA Member States, two representa-

tives from WHO and one representative each from FAO and WHO/PAHO.

I would like to note that despite the dissolution of ICGFI in May 2004, our Newsletter contains summaries of this and other ongoing and future activities related to the application of irradiation taking place under the various mechanisms available. These include the sponsoring of visiting scientists, the convening on an ad hoc basis groups of experts to provide independent and authoritative advice, collaboration with Codex, the IPPC and other international organizations and the technical cooperation programme (TC) and other assistance programmes of the agencies involved.

In closing, I wish to convey my best wishes to you and your families for a happy, healthy and prosperous New Year.

Sincerely,

*David H. Byron*

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## Staff Changes

### Agrochemicals Unit Head



Dr. Andrew Cannavan was selected to fill our professional post as Head of the Agrochemicals Unit at the FAO/IAEA Agriculture and Biotechnology Laboratory at Seibersdorf. Dr. Cannavan graduated with a Higher Diploma in Physical Sciences and a BSc (honours) in Biological Sciences from the University of Ulster. After gaining experience in pharmaceutical, polymer and biochemistry laboratories, he was employed in a UK National Reference Laboratory for veterinary drug residues from 1985 to 2001, where he was involved in research

and method development for the detection and control of drug residues and contaminants in animal-derived foods. Dr. Cannavan obtained his PhD in applied analytical chemistry from Queen's University in Belfast on the development and application of liquid chromatography-mass spectrometry methods for the detection and control of veterinary drug residues. In 2001, he joined the Animal Production and Health Section of the FAO/IAEA Joint Division of Nuclear Techniques in Food and Agriculture, where he acted as technical officer for several Technical Cooperation Projects, initiated a Coordinated Research Project and organized several training courses and workshops on the control of veterinary drug residues.

## Feature Article

### Second FAO/WHO Global Forum of Food Safety Regulators – Building Effective Food Safety Systems; Bangkok, Thailand; 12-14 October 2004

#### Background

As agreed by the First FAO/WHO Global Forum of Food Safety Regulators held in Marrakesh, Morocco, in January 2002, the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) jointly convened a Second Global Forum of Food Safety Regulators (GF-2) in Bangkok, Thailand, from 12-14 October 2004, on the theme of “*Building Effective Food Safety Systems*”.

These Global Fora of Food Safety Regulators provide the opportunity for food safety regulators from all regions of the world to meet together to consider, discuss and share experiences on food safety issues that are of concern to everyone. As for the First Global Forum, the Second Global Forum (GF-2) did not make any formal recommendations, nor did it arrive at any specific statements in regard to food safety issues. Sub-themes addressing the *Strengthening of official food safety control services* and *Epidemio-surveillance of foodborne diseases and food safety rapid alert systems* were selected for GF-2 discussions.

The Global Forum was attended by almost 400 participants from over 90 countries and 10 international governmental and non-governmental organizations. In addition to the thirteen working papers<sup>1</sup> discussed at the meeting, an additional 96 conference room documents<sup>2</sup> were submitted by countries and international organizations for consideration.

#### Discussions on Strengthening Official Food Safety Control Services

A representative of the Joint Division presented a conference room document regarding the *Activities of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture Related to Food Safety*<sup>3</sup>, especially in regard to discussions on the training of staff in official food control.

It was noted that since 1964, the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture has been in a unique position to promote the mandates of both FAO in its efforts to eliminate world hunger and poverty through sustainable agricultural development, improved nutrition and food security and the IAEA

through peaceful uses of atomic energy to accelerate and expand the contributions of these technologies to health and prosperity worldwide. It was stated that the mission of the Joint Division was to strengthen capacities for the use of nuclear methods to improve technologies for sustainable food security and to disseminate these techniques through international activities in research, training and outreach in its Member States, and that this assistance was primarily provided in areas related to food irradiation, pesticide and veterinary drug residues and radioactive contamination of foodstuffs.

The paper also outlined the efforts of the Food and Environmental Protection Section of the Joint Division and its associated FAO/IAEA Agriculture and Biotechnology Laboratory in providing food safety related assistance in coordination and support in research; providing technical and advisory services; providing laboratory support and training; and, collecting, analysing and disseminating information.

#### Discussions on Epidemio-surveillance of Foodborne Diseases and Food Safety Rapid Alert Systems

The Joint Division also presented a conference room document regarding *Preparedness for Nuclear Emergencies Affecting Agriculture*<sup>4</sup>, especially as related to discussions on food contamination monitoring and foodborne disease surveillance at the national level, international cooperation on food contamination monitoring and foodborne disease surveillance and prevention and response to intentional contamination. A slide presentation based on the conference room document was also made to the GF-2 *Workshop on Epidemio-surveillance of Foodborne Diseases and Food Safety Rapid Alert Systems*, and a poster on *Nuclear Emergency Information for Agriculture* was displayed.

The document summarized the efforts of the IAEA and NAFA in preparing for, and responding to, nuclear accidents or radiological events affecting agriculture. This included a brief overview of the *Joint Radiation Emergency Management Plan of the International Organizations* as well as a description of *Cooperative Arrangements Between FAO and IAEA* in this regard. In presenting the document, it was stressed that countries should plan in advance as to how contaminated food would be taken out of consumption and/or stored in appropriate facilities for disposal or destruction. The need for medium and long-term cost effective strategies for restoring agricultural land and the production of safe food products was highlighted, including cooperative efforts of the agency in revising the Codex Guideline Levels for Ra-

<sup>1</sup> See [http://www.foodsafetyforum.org/global2/agendaprov\\_en.asp](http://www.foodsafetyforum.org/global2/agendaprov_en.asp)

<sup>2</sup> See [http://www.foodsafetyforum.org/global2/crd\\_en.htm](http://www.foodsafetyforum.org/global2/crd_en.htm)

<sup>3</sup> See Conference Room Document 22 under [http://www.foodsafetyforum.org/global2/crd\\_en.htm](http://www.foodsafetyforum.org/global2/crd_en.htm)

<sup>4</sup> See Conference Room Document 34 under [http://www.foodsafetyforum.org/global2/crd\\_en.htm](http://www.foodsafetyforum.org/global2/crd_en.htm)

dionuclides in Foods for Use in International Trade. It was also noted that a document on *Preparedness for Nuclear Emergencies* was being prepared for presentation at

the forthcoming 19<sup>th</sup> Session of the FAO Committee on Agriculture (Rome, Italy, 11-15 April 2005).

## Forthcoming Events

### **Second Research Coordination Meeting (RCM) and Workshop on Testing the Efficiency and Uncertainty of Sample Processing for Analysis of Food Contaminants, Madurai, India, 21-26 February 2005**

Technical Officer: Josef Brodesser

Progress reports of research contract and agreement holders of this coordinated research project (D6.10.23) were evaluated and contracts renewed. The project was essentially "on hold" since the originally planned RCM had to be postponed from January 2004. It is now scheduled to take place from 21-26 February 2005 in Madurai, India. However, the project work was continued in order to allow for work in various laboratories to be completed according to the actual work plan.

Josef Brodesser will lead the RCM and represent the Agency. The former Head of the Agency's Agrochemicals Unit in Seibersdorf, Arpad Ambrus, will assist in the meeting scientifically. The aim of the RCM will be reporting, discussing and further planning of the ongoing CRP over a five-day period, to be followed by one additional day for practical experiments in the laboratory. The CRP participants were informed accordingly, and preparations with the host institute, the Madurai Kamaraj University, are in progress.

### **IAEA/RCA Final Review Meeting on the Application of Food Irradiation for Food, Security, Safety and Trade (RAS/5/042), Daejeon, Republic of Korea, 21-25 February 2005**

Technical Officer: Tatiana Rubio Cabello

The participants of the meeting will be the National Project Coordinators from RCA Member States participating in this project that have carried out activities and obtained results in connection with the objectives of the project.

The meeting will review and evaluate achievements of the project and lessons learned from its implementation. Strengthening of regional cooperation for the development and transfer of this technology will be discussed. Based on the information and needs identified, recommendations for future strategies and activities for the implementation of the technology at a national level will be made.

The meeting will be organized in the form of joint plenary sessions and parallel scientific discussion sessions. Each participant will be allocated a time of 45 minutes to make an oral presentation based on the written report. This will be followed by discussions, assessment of progress, future national activities, conclusions and recommendations.

### **IAEA/FAO Workshop on Distance Learning for Capacity Building on Pesticide Management, San Jose, Costa Rica, 18-22 February 2005**

Technical Officers: Ian Ferris and Kerstin Gross

Host: Professor Elizabeth Carazo (University of Costa Rica)

Inappropriate use of pesticides in the Latin America region has contributed to the detention of agricultural commodities and raised concerns about food safety and pesticide impact on health and the environment. Compliance with international standards and conventions, such as Codex, would enable States to take advantage of trade liberalization and promote national development. This requires technical and administrative infrastructures as well as the capacity for implementation. This IAEA/FAO/IUPAC training course will build on a preceding IUPAC workshop and launch the Joint FAO/IAEA Division's new eLearning management system (<http://elearning.iaea.org/ATutor/>). The focus will be the dissemination of information and skills in pesticide analysis and good agricultural practice. The meeting will also provide an opportunity to coordinate relevant national and regional IAEA TC projects and ARCAL regional projects. Nominations for participants have already been requested through official channels (see *Distance Learning* section of this issue).

### **Training Course on QA/QC Measures in Pesticide Residue Analytical Laboratories, Seibersdorf, Austria, Autumn 2005**

Technical Officer: Andrew Cannavan

A training course on "Quality assurance / Quality control measures in pesticide residue analytical laboratories" will take place at the FAO/IAEA Training and Reference Centre for Food and Pesticide Control at Seibersdorf, Austria in autumn 2005. The training course will be open to qualified analysts who are working in laboratories

performing official control on behalf of their governments. The objective of the training course is to introduce and discuss in detail the QA/QC principles relevant to pesticide residue analysis. Practical examples and hands on training will be used to demonstrate the general principles outlined in the ISO guide 17025 and OECD GLP

guidelines. Detailed information will be announced shortly on the web pages of FAO and IAEA and through liaison offices. If you wish to be informed through a mailing list please send an e-mail to: [A.Cannavan@iaea.org](mailto:A.Cannavan@iaea.org).

## Past Events

### **Joint FAO/IAEA/WHO Seminar on the Application of Irradiation for Sanitary and Phytosanitary Purposes, Bangkok, Thailand, 12-14 October 2004**

Technical Officer: David H. Byron

One of the recommendations of the final 20<sup>th</sup> Meeting of the International Consultative Group of Food Irradiation (ICGFI) held in Geneva, Switzerland in October 2003 was to convene a Working Group for discussions and provide advice on future activities related to the application of irradiation for sanitary and phytosanitary treatment.

The Working Group met at the IAEA Headquarters, Vienna, Austria in January 2004. As a result of its deliberations, a Seminar on the Use of Irradiation for Sanitary and Phytosanitary Purposes was held in conjunction with the FAO/WHO Global Forum for Food Safety Regulators, Bangkok, Thailand in October 2004 (see *Feature Article* of this issue).

The Government of Thailand agreed to host the Seminar that was held at the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) Conference Center on 11 October 2004.

The Joint FAO/IAEA/WHO Seminar was attended by over 30 participants from 11 IAEA Member States, two representatives from WHO and one representative each from FAO and WHO/PAHO.

The Seminar was chaired by A. Lustre (Philippines). Opening remarks were provided by the representatives of the three sponsoring organizations (D. Byron, J. Schlundt, G. Moy). Presentations were made on the Achievements of the International Consultative Group on Food Irradiation (A. Lustre), Use of Irradiation for Sanitary Purposes (T. Rubio-Cabello), Safety of Irradiated Food (G. Moy) and Current and Future International Organization Activities on the Use of Irradiation (D. Byron).

Whilst recognizing the dissolution of ICGFI in May 2004, participants at the Seminar suggested that further assistance was needed to train analysts in the detection of irradiated foods and in the communication of risk to relevant parties. It was noted that these and other proposed areas of activity in irradiation could be carried out

through the various mechanisms available, including the sponsoring of visiting scientists, the convening on an ad hoc basis groups of experts to provide independent and authoritative advice, collaboration with Codex, the IPPC and other international organizations and through the technical cooperation program (TC) and other assistance programs of the agencies involved.

### **FAO Workshop on Good Agricultural Practices (GAP), Rome, Italy, 27-29 October 2004**

Technical Officer: David H. Byron

The Joint Division participated in a FAO Workshop on Good Agricultural Practices (GAP) at FAO Headquarters in Rome, Italy from 27-29 October 2004. The objective of the Workshop was to share FAO experiences, methodologies and approaches to the application of GAP, to draw lessons from FAO GAP activities and to identify future collaborative work on GAP.

The three-day meeting considered resource papers on good agricultural practices for crop and livestock production as well as the analysis of important GAP programmes, codes and standards external to the FAO. Outcomes and experiences arising from videoconferences on GAP held in the FAO Regional Offices for Latin America, Asia, Africa and the Near East, as well as the Report on the FAO Expert Consultation on GAP held in November 2003, were also considered.

It is anticipated that the report and recommendations of the FAO Workshop will be available for distribution in the near future.

### **Best Management Practice and QC/QA in Pesticide Residue Analysis, Damascus, Syrian Arab Republic, 3-12 October 2004**

Technical Officer: Josef Brodesser

A practical national training seminar and workshop was organized and conducted at the facilities of the Atomic Energy Commission of Syria (AECS) at Dubaia from 3-12 October 2004. Under TC project SYR5018, Josef Brodesser contributed with lectures on laboratory quality management during the workshop, whereas consultant Ms. Maha El Bidaoui guided the participants through the

practical part of the course. The main objective of the training was the strengthening of analytical methodologies of pesticide residue analysis in environmental matrices and in food. In this regard, hands-on training was provided, comprising sample collection, preparation, clean-up and residue analysis by gas chromatography as well as data evaluation and the calculation of statistical parameters derived. Altogether 15 trainees participated, mostly from AECS, but also from other institutes that would play a role in pesticide residue analysis in the future. The introduction of a laboratory quality management system according to ISO Standard 17025 was addressed in the lectures, and the existing respective documentation system was mock audited. In addition to the practical training and lectures, the work plan and the project matrix of the future project approach were further elaborated together with the counterpart.

### **Mycotoxin Analysis - Aflatoxins, Ochratoxin A, Vomitoxine, Fumonisine, Dakar, Senegal, 29 November-12 December 2004**

Technical Officer: Josef Brodesser

A practical national training seminar and workshop was organized and conducted at the facilities of the Institut de Technologie Alimentaire (ITA) in Dakar, Senegal, from 29<sup>th</sup> November to 10<sup>th</sup> December 2004 under TC project SEN5027. Josef Brodesser contributed to the training with lectures on laboratory quality management during the second week of the training, whereas consultant Mr. Michel Blanc conducted the practical aspects of the two-week course. The main objective of the training was the strengthening of analytical methodologies of mycotoxin analysis in food matrices. In this regard, hands-on training was provided, comprising sample collection, preparation, clean-up and mycotoxin residue analysis by means of various analytical techniques, such as HPLC, TLC and ELISA. Data evaluation and the calculation of statistical parameters were also included. There were about 10

trainees, mostly from ITA, but also other nationals and participants from neighbouring countries were invited.

Moreover, the work plan and project matrix for the coming TC project phase were discussed with the counterpart and further project tasks elaborated.

### **FAO/IAEA Workshop on Quality Assurance for Irradiation Facilities, Beijing, China, 23-27 August 2004**

Technical Officer: Tatiana Rubio Cabello

At present, some international standards, such as ISO 9000, are applied in only a few irradiation facilities in the Asian region and most of the personnel working in these facilities have not had any specific training on quality assurance. To fulfil this need, two activities were organized in Beijing from 23-30 August 2004, namely, a regional training course on Quality Assurance System of Irradiation Facilities, and; a national workshop on Quality Control and Management of Food Irradiation Facilities. Both activities were organized under the regional project RAS/5/047 "Food Safety, Security and Trade".

The purpose of the regional training course on "Quality Assurance System of Irradiation Facilities" was to provide professionals with experience in the operation of pilot/commercial irradiation facilities in the region with up to date information on quality assurance and control of irradiation facilities that are treating food and food products. Sixteen participants from 11 countries of the region attended the training course.

The training course included different subjects, such as general concepts on quality assurance, efficient and safe operation of irradiation facilities, dosimetry, traceability, quality of the foods to be irradiated, HACCP, audit, development of food irradiation and international standards. The training course was complemented with an exercise of audit at the irradiation facility of the Irradiation Center of the Chinese Academy of Agricultural Science in Beijing.



*Auditing exercise at the Irradiation Center of the Chinese Academy of Agricultural Science in Beijing, part of the training workshop on Quality Assurance System of Irradiation Facilities, 23-27 August 2004*



## National Workshop on Quality Control and Management of Food Irradiation Facilities, Beijing, China, 28-30 August 2004

After the regional training course, a three-day national workshop on “Quality Control and Management of Food Irradiation Facilities” was also organized as a result of a request of the Government of China to the IAEA. The purpose of the national workshop was to give up to date information about the operation and modern management of irradiation facilities and to provide a forum to exchange experiences among the participants.

The programme of the training course included two and half days of lectures (quality assurance, efficient and safe operation of the irradiation facilities, quality of the foods to be irradiated, audit, international standards on food irradiation, quality of management and economic aspects)

as well as an additional day of round table discussions and conclusions.

The national workshop was attended by more than 90 participants from different provinces of China.

Both training activities were important in terms of giving the most current information on quality assurance of irradiation facilities to professionals who are operating pilot/commercial irradiation facilities in the region. Most of the participants declared that as a result of the training received, they would implement a series of measures in their irradiation facilities immediately.

The training course, as well as the national workshop, constituted a good forum to exchange experiences in the operation of irradiation facilities and discuss future activities among the participants.



*Participants of the National Training Workshop Quality control and Management of Food Irradiation  
28-30 August 2004*

## Joint Meeting between IUPAC Project “Global Availability of Information on Agrochemicals”, IUPAC Project “A Critical Compendium of Pesticide Physical Chemistry Data” and the FAO/IAEA INFOCRIS (International Food Contaminant and Residue Information System), 18 September 2004, Vienna, Austria

Technical Officer: Ian Ferris

On 18 September 2004 participants from three international projects involved in collecting, reviewing and publicizing pesticide active ingredient properties met to explore possible synergies amongst the projects and ways to reduce unnecessary duplication of effort. The IUPAC representatives were Heinz Gamsjager, David Shaw, Adam Skrzecz, John Unsworth and Don Wauchope (unable to attend) while David Byron and Ian Ferris repre-

sented the Joint FAO/IAEA Division. The IUPAC project “Global Availability of Information on Agrochemicals” (chaired by John Unsworth) is designed to “increase the global availability of information on the chemistry of agrochemicals, including methods for testing and evaluation, summaries of properties for individual pesticides, and regulatory standards for pesticides” (<http://www.iupac.org/projects/2001/2001-022-1-600.html>). The source of this project is the IUPAC Advisory Committee on Agrochemicals which, conscious of the amount of information on pesticides on the Internet, has a desire to ensure the dissemination of accurate technical information on the chemistry of pesticide active ingredients. The IUPAC project “A Critical Compendium of Pesticide Physical Chemistry Data” (co-chaired by David Shaw and Don Wauchope) is designed to “establish an IUPAC compendium of critically evaluated values

for aqueous solubility, vapour pressure, octanol/water partition coefficient ( $K_{ow}$ ) and acid/base dissociation constant ( $pK_a$ ) for active ingredients of pesticides” (<http://www.iupac.org/projects/2003/2003-011-3-600.html>). This project grew out of dissatisfaction with the quality of documentation, and sometimes the wide range of reported values for the fundamental physical/chemical properties of pesticide chemicals. The aim of the FAO/IAEA INFOCRIS (International Food Contaminant and Residue Information System) project is to create a knowledge commons where information is freely shared using simplified web-based procedures and the Joint FAO/IAEA Division’s resource databases. Emphasis is on Codex standards and facilitating international food trade in relation to contaminants and residues. INFOCRIS targets FAO’s and IAEA’s medium term objectives by becoming an authoritative source of technical information and its dissemination for improved decision-

making and public understanding of food contaminants and residues.

Whilst these projects have a different emphasis they share a common goal, namely, providing authoritative information on pesticides. In each project the accurate reporting of physicochemical data is a key parameter. The meeting considered how the INFOCRIS website could host the infrastructure needs of the IUPAC projects, while providing INFOCRIS with an infusion of technical information, potential editors and an authoritative peer review process. After wide ranging discussions an action plan was agreed upon. The revised INFOCRIS procedures will be showcased at the IUPAC-CICA-UCR MAG-CR, International Workshop on Crop Protection Chemistry in Latin America Harmonized Approaches for Environmental Assessment and Regulation on 14-17 February 2005 at the University of Costa Rica, San Jose, Costa Rica (<http://www.iupac.org/symposia/2005/crop-protection-chemistry/index.html>).

## Status of Coordinated Research Projects

### **Quality Control of Pesticide Products, D6.10.23**

Technical Officer: Josef Brodesser

The CRP is dealing with the elaboration and validation of analytical methods based on already peer verified methods published by CIPAC and AOAC. The aim is to broaden the scope of single compound analysis and at the same time to validate multi methods which allow the reduction of the consumption of costly reference material, solvents and analysis time.

Progress reports of research contract and agreement holders were evaluated and research contracts renewed accordingly. The next RCM is planned for the end of 2005, the venue and dates are still to be determined.

### **Validation of Thin-layer Chromatographic Methods for Pesticide Residue Analysis, D5.20.33 and D5.20.34**

Technical Officer: Josef Brodesser

Reports of the participants and results of the work performed within the coordinated research projects D5.20.33 and D5.20.34 are being compiled and revised for publica-

tion as a single TecDoc. Its publication is foreseen in the first quarter 2005.

### **Irradiation to Ensure the Safety and Quality of Prepared Meals, D6.20.07**

Technical Officer: Tatiana Rubio Cabello

This CRP was initiated at the end of 2001. There are 12 research contracts and three agreement holders. Progress is being made as the participants perform the tasks satisfactorily and reports are submitted. The final RCM will be held in July 2005 in Pakistan.

### **Use of Irradiation to Ensure Hygienic Quality of Fresh, Pre-cut Fruits and Vegetables and other Minimally Processed Food of Plant Origin, D6.10.22**

Technical Officer: Tatiana Rubio Cabello

Progress continues on the determination of the feasibility of using irradiation in fresh, pre-cut fruits and vegetables, and other minimally processed food of plant origin. Preparations have begun for the final RCM to be held in Pakistan in July 2005.

## Current Technical Cooperation Projects

Project Number	Title	Technical Officer
BOL/5/015	Developing Pesticide Residue Monitoring Capabilities in Support of Cash Crops	I.G. Ferris
CHI/5/022	Detection of Pesticide Levels in Water and Agricultural Soil Using Nuclear Techniques	I.G. Ferris and K. Gross
COS/5/024	Toxic Residues of Pesticides in Soils and Water	I.G. Ferris and K. Gross
MOR/5/024	Industrial Application of Irradiation	T.Rubio-Cabello
NIR/5/030	Regulatory Control and Monitoring of Contaminants and Residues in Fresh Produce	D.H. Byron and J. Brodesser
PER/5/026	Radiosterilization of Pre-Cooked Meals for Hospital Diets	T.Rubio-Cabello
RAS/5/042	Application of Food Irradiation for Food Security, Safety, and Trade (RCA)	T.Rubio-Cabello
ROK/5/034	Nutrient Efficient Crops and Safe Use of Pesticides in Sustainable Crop Production	I.G. Ferris
SEN/5/027	Regulatory Control and Monitoring of Contaminants and Residues in Fresh Produce	D.H. Byron and J. Brodesser
SRL/5/037	Assessing Impact of Pesticides on Water Catchments and Groundwater	J. Brodesser
SYR/5/018	Pesticide Degradation in Food and Environment	I.G. Ferris and J. Brodesser
THA/5/047	Application of Food Irradiation for Sanitary and Phytosanitary Certification	T.Rubio-Cabello
TUR/5/022	Food Irradiation Technology	T.Rubio-Cabello

## FAO/IAEA Agriculture & Biotechnology Laboratory, Seibersdorf

Following staff changes, including the appointment of a new Unit Head (see *Staff Changes* in this issue), some reorganization is currently taking place in the Agrochemicals Unit of ABL. The future programme will integrate veterinary drug residues, formerly overseen by the Animal Production and Health Section, with the current focus on pesticides and pesticide residue analysis. With the completion of our current study on fumonisin, work on mycotoxins will be reduced. It is hoped that we will be able to upgrade some of the instrumentation in the Unit in the future, particularly by introducing LC-MSMS, to meet the training and method development/validation requirements imposed by the ever more stringent international guidelines and legislation for the quality assurance of food products with respect to residues and contaminants. Many Member States have recently invested in advanced instrumentation to protect export markets and there is a growing number of re-

quests to the subprogramme for assistance in the application of these instruments through training and technology transfer.

Ongoing studies are continuing to provide data on the uncertainty of sampling for pesticides in various matrices. The study on mango has been completed and is summarised below and a similar study on kale is nearing completion. Also nearing completion is a study on the methodology for multi-residue analysis of pesticides in soil for small (reduced) analytical portions (down to 1/10 of AP in current practice in most laboratories).

### Fellowships and training

To date, three fellows, one from Nigeria and two from Serbia & Montenegro have been accepted for training in the Agrochemicals Unit during 2005.



Former fellows in 2004, Front left: Valentina Brambilla; Middle: Perihan Yolci; Front right: Gabriella Suzter; Back left: Mara Bettaglio; Back right: Abduolayi Sako

A training workshop on QA/QC in pesticide residue analysis is being planned to take place at the FAO/IAEA Training and Reference Centre for Food and Pesticide Control, Seibersdorf, Austria in 2005. Further information is available under *Forthcoming Events* in this issue of the newsletter.

### Mango Analysis

Technical Officer/Study Director: Marivil Dabalus Venida

Study participants: M. Schweikert Turcu, P. Klaus, M.N. Rathor and A. Ambrus

As part of a project on “sampling guidelines for fruits and vegetables”, the Agrochemicals Unit has just concluded a study on pesticide residues in mango fruits.

Mango, a delicious and desirable fruit produced mostly in tropical countries, is a cash crop and major export product of many developing countries. Pesticide residues need to be carefully monitored in such products to avoid trade barriers due to residues exceeding the MRLs

applied by the major importing markets such as the U.S. and Europe. It is known that a major contributing factor to the reliability of residue data of any agricultural produce is the variation due to sampling, and the sampling strategies currently in place in developing countries are often inadequate. Data need to be produced to effectively design proper sampling plans to ensure the effectiveness of monitoring programmes.

In March 2004, mango samples with a known field treatment history including chlorpyrifos and cypermethrin were received from Malaysia. An analytical procedure was adapted and validated before the serial analysis of the samples. A validation procedure based on five fortification levels was performed for both active ingredients. The LOQ levels were 0.001mg/kg and 0.005mg/kg for chlorpyrifos and cypermethrin, respectively. The analytical procedure consisted primarily of sample processing (chopping, homogenizing), extraction with ethyl acetate, centrifugation, clean-up with SPE-Envi-Carb black cartridge, evaporation and dissolution of the residue in acetone:isooctane. The extract was analysed by gas chromatography with electron capture detector (GC-ECD) for the identification and quantitation of analytes present.

The repeatability and reproducibility of the method was determined in order to check the reliability of the procedure and the efficiency of the analysts performing the analysis. The tables below revealed the performance of the method to be within the acceptable criteria provided by CODEX.

The results from this field trial will be collated with those from other collaborating countries and used to draft recommendations for improving sampling procedures.

Table 1. Method repeatability and intra-laboratory reproducibility for chlorpyrifos

Fortification level (mg/kg)	0.001	0.05	0.5	1.0	3.0
CV <sub>AR</sub>	7.0	9.6	5.2	7.1	5.0
CODEX Criteria	53.0	32.0	23.0	23.0	16.0
CV <sub>Ar</sub>	7.3	7.6	5.2	3.4	2.8
CODEX Criteria	35.0	20.0	15.0	15.0	10.0

CV<sub>AR</sub> - CV analysis for reproducibility  
 CV<sub>Ar</sub> - CV analysis for repeatability

Table 2. Method repeatability and intra-laboratory reproducibility for cypermethrin

Fortification level (mg/kg)	0.05	0.5	1.0	3.0	5.0
CV <sub>AR</sub>	17.7	9.1	6.1	8.9	6.9
CODEX Criteria	32.0	23.0	23.0	23.0	23.0
CV <sub>Ar</sub>	11.7	5.2	6.9	3.1	6.9
CODEX Criteria	20.0	15.0	15.0	15.0	15.0



*Preparation of Mango samples*



*A typical mango (Mangifera indica) tree grown in tropical and subtropical countries with bulky shrubs and branches. The mango is an evergreen tree which can grow up to 27m but in most commercial orchards, trees are pruned to 4 to 7m high. There are over 800 known varieties with fruits produced in clusters on long stems. Its fleshy fruit has a sweet and slightly acidic taste which makes it one of the most popular international fruits. The control of major pests of mango requires 3-4 different insecticides which may be mixed with foliar fertilizers and fungicides during the production stage. Therefore, the services of food control laboratories are necessary to ensure the safety of the mango both for local and international consumption.*

# Nuclear Preparedness

## Emergency preparedness and response

The Chernobyl nuclear power plant accident highlighted the impact and long-term consequences of a major trans-boundary release of radioactive material. More effective regulatory mechanisms, training of operators and design modifications have improved the safety of nuclear power plants. Yet there remain continuing safety and security concerns related to the control of radioactive sources. Despite the level of attention given to this problem since September 2001, many countries still lack programmes, resources and legal frameworks to properly respond to the threat of nuclear and radiological emergencies.

As at 31 August 2004, there were 439 nuclear power reactors in operation in 30 countries and an additional 26 units are under construction in 10 countries. The five nuclear-weapon states are estimated to have 16 500 operational and a total of 36 500 active and inactive warheads. These have institutional security systems to protect them from theft and malevolent use. However there is concern about the possible use of a radiological dispersal device or 'dirty bomb' that could contaminate land and/or facilities. Radioactive materials for such devices are available from a wide range of less secure facilities, including those in industry, hospitals, medical and research laboratories, universities and waste dumps. Given widespread public anxiety about nuclear material in any form, the mere threat of such use of radioactive materials could be a potent terrorist tool. The same considerations would apply to attacks on nuclear power facilities, reprocessing facilities or on shipments of nuclear materials.

The immediate (24 hours) and short-term (one-month period) impact of a nuclear emergency can be effectively mitigated if emergency response plans in relation to food and agriculture are in place. Scientists estimated that of the 2000 thyroid cancers that occurred among children contaminated after Chernobyl, 90 percent would have been avoided if consumption of contaminated milk had been banned. By controlling the ingestion of contaminated fresh vegetables, a further reduction of 50 percent would have been obtained, pushing down the number of excess thyroid cancers to 100. A poster providing basic guidance for nuclear emergencies affecting agricultural is available

[http://www.iaea.org/programmes/nafa/dx/emergency/images/poster\\_V6.jpg](http://www.iaea.org/programmes/nafa/dx/emergency/images/poster_V6.jpg)). It is therefore essential that Member Countries plan in advance how the most contaminated products will be withdrawn and/or stored in appropriate facilities for eventual disposal or destroyed through appropriate procedures.

In the medium- and longer-term, sustaining acceptable living and working conditions in contaminated areas will require practical and cost-effective strategies for restoring

and managing contaminated agricultural land and food products. These strategies need to consider a wide range of factors: timing and nature of countermeasures; site-specific factors such as soil properties, root systems and land uses; quantity and composition of the radionuclides released (particularly long-life radionuclides); pathways of radionuclide exposure for each population group; and cost and duration of countermeasure application. The feasibility of these strategies and their acceptability to stakeholders should be considered before implementation. A radionuclide countermeasure information system is being developed to aid States. In the short-term, the STRATEGY countermeasure compendium is now available in a convenient web format

(<http://www.iaea.org/programmes/nafa/dx/emergency/countermeasures.html>).

The Safety Requirements for Preparedness and Response for a Nuclear or Radiological Emergency cite the Codex Alimentarius Commission's guideline levels for radionuclides in food moving in international trade following accidental contamination as generic action levels. The competent management authority should specify intervention levels for use in emergency situations in advance. Appropriate remedial action should be taken if the maximum permissible level is exceeded or is predicted to be exceeded. The Joint FAO/WHO Codex Alimentarius Commission is the international standard-setting body responsible for the protection of human health and facilitation of international trade in foodstuffs. The current Codex Guideline Levels for Radionuclides in Foods Following Accidental Nuclear Contamination for Use in International Trade that apply for one year following a nuclear accident are currently being revised to cover a wider range of situations and to serve as generic intervention levels for a year or more following a nuclear or radiological event.

FAO is full party to two conventions: (i) the notification convention, which requires the Accident Country to notify and provide information to potentially affected countries and the IAEA. The IAEA must report the notification and provide information to Member Countries and International Organizations; and (ii) the assistance convention, which enables any national Government to request emergency assistance from the IAEA and/or other parties including: assessment and advice; field assistance, including monitoring; and medical treatment. The IAEA provides/brokers assistance through ERNET and relevant international organizations, including FAO. The Joint Radiation Emergency Management Plan of the International Organizations is a high-level management document that describes the inter-agency framework for preparedness and response to an actual, potential or per-

ceived nuclear emergency and specifies the roles and responsibilities of each international agency. The practical arrangements between FAO and IAEA for notification, information exchange and provision of technical support in relation to food and agriculture in the case of a nuclear or radiological emergency and its aftermath have been described in the FAO/IAEA Cooperative Arrangements which were signed into force on 25 April 2003.

To fulfil its commitment, FAO is undertaking a series of initiatives aimed at strengthening its support to member countries in the case of such an event:

- An operational nuclear crisis unit in the Special Emergency Programmes Service (TCES) of the Emergency Division (TCE) is being set up, linking to the Joint FAO/IAEA Division and the Emergency Response Centre of IAEA that acts as the focal point for preparedness and response to a nuclear event. This activity consists of (i) formalizing a team of technical experts dealing with nuclear or radiological event in relation to food and agriculture, (ii) setting up a crisis management facility and (iii) developing procedures for the running of this unit in the case of an event.
- FAO is giving priority to making all relevant existing information (research results, practical decision support tools including first actions for Member States who may require assistance, FAO databases that are relevant to the application of agricultural countermeasures i.e. soil types, nutrition patterns, land-use, etc.) easily accessible to member countries. A CD-ROM containing over 100 datasheets describing potential agricultural countermeasures and incorporating all criteria that decision-makers might consider when evaluating different agricultural countermeasures will also be made available.

## Distance Learning

Technical Officer: Kerstin Gross

The Food and Environmental Protection Subprogramme of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, in partnership with affiliated subprogrammes, divisions and other organizations, is preparing eLearning materials in food safety and environmental protection. These courses will accelerate capacity building for pesticide management.

This is a new initiative to harmonize capacity building and implement the first part of training at the beginning of TC-projects, making maximum use of project time and resources. Under this new approach, training will consist of two parts:

1) distance learning courses, and

Since Member States have the ultimate responsibility to protect life, property, the environment and quality of life on their territories, preparedness plans are essential and involve planning how to respond and network resources effectively in the event of a nuclear emergency. Research and case studies have so far been limited to countries affected by Chernobyl and developed countries. There is a need to focus now on developing countries. While it is recognized that agricultural countermeasures would differ from one country to another, depending on national capacity, existing regulations, production systems, and location of nuclear plants, FAO can assist member countries to develop a strategy for promoting and enhancing preparedness for any nuclear event in relation to food and agriculture. To date, the primary mechanism has been workshops on practical agricultural countermeasures and web/CD-ROM information resources. Increasingly, harmonized distance learning materials will complement these approaches.

In conclusion, there has been a shift in priority from recovery to preparedness, with more emphasis being placed on the need to protect in advance of a nuclear emergency. At present, only 92 States are party to the Early Notification Convention and 89 States are party to the Assistance Convention, i.e. less than half of FAO Member States. Thus an important first step in strengthening international nuclear emergency preparedness is the ratification of the early notification and assistance conventions by all FAO and IAEA Member States. The next step is the implementation of national emergency preparedness plans to minimize gaps in regional food safety and security. For further information visit and bookmark the site (<http://www.iaea.org/programmes/nafa/dx/emergency/index.html>)

## e-Learning

2) laboratory training (after successful fulfillment of part 1).

The eLearning management system is an interactive knowledge acquisition system that can be accessed via the internet and that allows students to register and take part in courses on specific topics. Each course contains up to ten modules, and at the end of each module there is an exam. Registration and participation in the eLearning programme is immediate and free of charge. Affiliated universities are working towards incorporating the distance learning into an M.Sc. programme, which should entail registration fees, if a degree is aimed at. Partner organizations and affiliate universities have agreed in

principle to peer review the content of the courses, assuring quality.

The eLearning programme *targets* laboratory personnel and managers, including national decision-makers responsible for food safety and the implementation of agricultural plans. The *aim* of the eLearning courses is to ensure that all participants at FAO/IAEA sponsored training courses and workshops have the necessary pre-requisite skills before commencing with practical hands-on training. As a *result*:

- It will be easier and cheaper to enhance individuals' technical competencies, as a wider audience will have access to specific knowledge and training opportunities in the field of food safety and environmental protection;
- New skills can be applied on-the-job, thus accelerating capacity building and more comprehensive food chain approaches that foster the application of Good Agricultural Practices (GAPs);
- Resources will be used more efficiently during laboratory training, since maximum time and effort will be allowed for practical, hands-on training, instead of filling gaps in background and/or pre-requisite knowledge.

The food safety programme will include the following courses:

- ◆ The role of the Codex Alimentarius in food safety
- ◆ Pesticide residue analysis
- ◆ Pesticide management

- ◆ Veterinary drug residues in food
- ◆ Radionuclides in food and feed
- ◆ Mycotoxins in food and feed
- ◆ Heavy metals in food and feed
- ◆ Laboratory prerequisites
- ◆ Chromatographic and other analytical techniques
- ◆ Basic statistics
- ◆ Sampling
- ◆ Quality assurance/Quality control

The official launch of the Division's eLearning system is planned for February 2005 during the IAEA/FAO/IUPAC Workshop on "Distance learning for capacity building on pesticide management" at the University of Costa Rica.

ELearning is much more than taking a course from a remote location: eLearning means being in contact with other students through specific forums, having the possibility of evaluating courses through polls and sending feedback to the elearning managers, and fostering a network of experts.

You can visit the platform at <http://elearning.iaea.org/ATutor/login.php> and login as a student:

Logname: Student  
Password: Student

(See Section *Forthcoming Events* of this issue for information on upcoming Workshop.)

## Websites

Food and Environmental Protection Section  
<http://www.iaea.org/programmes/nafa/d5/index.html>

FAO/IAEA Training and Reference Centre for Food and Pesticide Control: <http://www.iaea.org/trc>

elearning: <http://elearning.iaea.org/ATutor/login.php>

International Database on Insect Disinfestation and Sterilization – IDIDAS: <http://www-ididas.iaea.org/>

International Food Contaminant and Residue Information System – INFOCRIS: <http://www-infocris.iaea.org>

As part of a broader IAEA initiative to improve the security of hosted websites, INFOCRIS was updated and moved to a more powerful server and integrated with the

Joint Division's eLearning resource. Additional work included the implementation of Mathematical Markup Language (MathML) for eArticles together with an export function to cater for clients who have limited Internet access. MathML belongs to the Extensible Markup Language (XML) family and is an important outcome of the World Wide Web Consortium's initiative to improve interoperability. MathML greatly facilitates the use and re-use of mathematical and scientific content on the Web. For editors familiar with Hyper Text Markup Language a parser or sandbox simplifies the addition of valid XML content. Otherwise, editors may use a WYSIWYG (what you see is what you get) as shown below:



For further information about eArticles or MathML templates see “eArticles: Getting started” ([http://www-infocris.iaea.org/en/w3.exe\\$PassCheckStart?ID=E12](http://www-infocris.iaea.org/en/w3.exe$PassCheckStart?ID=E12)). Editors should also bookmark the revised INFOCRIS manual (<ftp://ftp.iaea.org/dist/rifa-trc/infocris-editor-man1.pdf>). If you would like to adopt a contaminant (entity) in your area of expertise, contact the system administrator for details ([INFOCRIS.feedback@iaea.org](mailto:INFOCRIS.feedback@iaea.org)).

## Publications

“Irradiation as a Phytosanitary Treatment of Food and Agricultural Commodities”, Results of a Coordinated Research Project which began in 1998 and was completed in 2002. IAEA-TECDOC-1427.

“Determination of Human Pathogen Profiles in Food by Quality Assured Microbial Assays”, Results of a Coordinated Research Project which began in 1998 and was completed in 2002. IAEA-TECDOC-1431.

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