



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

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A. To the Reader

I am pleased to announce that we are currently evaluating applications to fill a professional post for a Food Safety Specialist within the Food and Environmental Protection Section of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. It is envisioned that the qualified candidate selected would support Member States in the development of quality control mechanisms in the areas of food and environmental protection; would provide technical advice to support efforts towards research activities, technology transfer and laboratory accreditation; and would organise training activities and write guidelines, protocols, standard operating procedures and related technical documents. Major responsibilities in the new position will reflect a broadened scope related to quality control in the area of good agricultural practices throughout the food chain.

This issue of our Newsletter also includes a summary of the 20th Meeting of the International Consultative Group on Food Irradiation, which was recently held at WHO Headquarters in Geneva, Switzerland, from 7-9 October 2003. Among other things, the ICGFI Meeting unanimously supported the presentation of the Engel Award to both Dipl.-Phys. Dieter A.E. Ehlermann and Paisan Loaharanu. The Engel Award is presented to those individuals that have made an outstanding contribution to the cause of food irradiation.

Dr. Ehlermann was recognized for his significant contributions to the acceptance of food irradiation as a safe and beneficial technology through work in the areas of food science, the provision of technical information and education. Dr. Ehlermann's contributions were based on his background of over 35 years in the field of food

irradiation and in the publication of over 200 scientific publications related to the technology. From 1966 until his retirement in 2003, Dr. Ehlermann was a respected staff member of the Federal Research Centre for Nutrition, Institute of Process Engineering in Germany.

Mr. Loaharanu was recognized for his role in helping developing countries in the acceptance and application of food irradiation in order to gain the associated benefits related to food security, food safety and international trade. His efforts over the past 30 years have led to the training of many technicians in the developing world, the creation of new international standards for the use of irradiation for both sanitary and phytosanitary purposes and the development of scientific and technical data in support of the technology. Mr. Loaharanu also served as my predecessor in his capacity as Head of the Food and Environmental Protection Section of the Joint Division, as well as Secretariat to ICGFI, for over 20 years.

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

Sincerely,

David H. Byron

B. STAFF

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Staff Changes

As many of you are aware, Dr. Bruno Doko, who has served as a Mycotoxin Specialist with the Food and Environmental Protection Section since June 2000, retired from the Agency on 31 October 2003. Bruno was responsible for formulating and guiding research, technology transfer and training in the area of mycotoxin analyses in food and feed.

Venida Marivil Dabalus joined the Agrochemicals Unit of the FAO/IAEA Agriculture and Biotechnology Laboratory in Seibersdorf in May 2003 as a short-term staff member and commenced her fixed term appointment with the Agency on 12 November 2003. Marivil obtained both her Bachelors and Masters Degrees in Chemistry at Adamson University in Manila, Philippines. She previously worked eight years in a pesticide residue laboratory in the Philippines and is currently performing activities on mycotoxin analysis specifically for corn, providing training for interns and fellows on analysis of micotoxins with HPLC and is assisting in the sample preparation of large crops for a project regarding the uncertainty of sample processing.

Kerstin Gross joined the Food and Environmental Protection Section as a Junior Professional Officer in October 2003. Kerstin obtained a BSc in biology and an MSc in applied environmental sciences at the Universities of Bristol and London, respectively, and carried out her PhD studies at the University of Bonn. Kerstin also interned in the Nutrition and Health-Related Environmental Science Section (NAHRES) at the IAEA Division of Human Health and recently worked in the European Commission Co-Ordination Team (ECCO) at the Federal Office for Consumer Protection and Food Safety (BVL) in Germany. In collaboration with her other colleagues in the Section, Kerstin will be responsible for the preparation of training and support materials for analytical services and research related to the application of Codex standards for pesticide and veterinary drug residues, radionuclides, toxic metals, mycotoxins and microbiological contaminants in foods, as well as the preparation of distance learning modules.

C. FEATURE ARTICLE

RESULTS OF THE 26TH SESSION OF THE JOINT FAO/WHO CODEX ALIMENTARIUS COMMISSION (ROME, ITALY, 30 JUNE – 7 JULY 2003)

Introduction

The Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, including the Food and Environmental Protection Section and the FAO/IAEA Agriculture and Biotechnology Laboratory of the Agency's Laboratories at Seibersdorf, provides direct support to the Joint FAO/WHO Codex Alimentarius Commission in its standardization efforts to enhance food quality and safety, the protection of consumers and the promotion of trade in food and agricultural products. Assistance is also provided to the Codex Alimentarius Commission by other Divisions of the International Atomic Energy Agency as well as through the International Consultative Group on Food Irradiation (ICGFI), established under the aegis of FAO, IAEA and WHO.

The most recent 26th Session of the Codex Alimentarius Commission met in Rome, Italy from 30 June-7 July 2003. The meeting was attended by 481 delegates, alternates and advisors from 124 Member countries and 77 representatives from 48 international governmental and non-governmental organizations, including a representative of the IAEA.

General Results of the 26th Session of the Codex Alimentarius Commission Related to Activities of the International Atomic Energy Agency

General decisions of the 26th Session of the Codex Alimentarius Commission related to the activities of the International Atomic Energy Agency are as follows:

- Approval of new work to undertake revisions and/or amendments to the Codex Guideline Levels for Radionuclides in Foods Following Accidental Nuclear Contamination for Use in International Trade;
- Establishment of methods of analysis for the detection of contaminants, including pesticides;
- Final adoption of the Revised Codex Guidelines on Good Laboratory Practice in Pesticide Residue Analysis;
- Approval of new work to undertake the elaboration of Codex Guidelines on the Use of Mass Spectrometry for Identification, Confirmation and Quantitative Determination of Residues; and
- Approval of new work to undertake the elaboration of Codex Guidelines on the Estimation of Uncertainty of Results.

All of the matters referred to above were successfully considered by the Commission. It is noted that these subjects were elaborated by various Codex committees in collaboration with the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, the IAEA Division of Radiation and Waste Safety, the FAO/IAEA Agriculture and Biotechnology Laboratory and the FAO/IAEA Training and Reference Center for Food and Pesticide Control.

Specific Results of the 26th Session of the Codex Alimentarius Commission Related to Activities of the International Consultative Group on Food Irradiation (ICGFI)¹

Specific decisions of the 26th Session of the Codex Alimentarius Commission related to the activities of the International Consultative Group on Food Irradiation included the final adoption of the Revised Codex General Standard for Irradiated Foods (CODEX STAN 106-1983, Rev. 1-2003).

In discussing the final adoption of the Codex Standard at the most recent 20th Meeting of the ICGFI, the representative of the Joint FAO/WHO Food Standards Programme (Codex Alimentarius) noted that the text contained in Section 2.2 (Absorbed Dose) and Section 5.3 (Re-Irradiation) of the Standard was a compromise solution arrived at by the Codex Committee on Food Additives and Contaminants² to allow for exceptions to the maximum absorbed dose of 10 kGy in cases where it was necessary to achieve a legitimate technological purpose (i.e. for the treatment of spices) and with the stipulation that such applications should not compromise consumer safety, wholesomeness, or would adversely affect the structural integrity, functional properties or sensory attributes of the food. It was also noted that subsequent to the 35th Session of the Codex Committee on Food Additives and Contaminants in March 2003, the 31st Session of the Codex Committee on Food Labelling (May 2003) endorsed³ the labelling provisions of the Standard with minor amendments.

The representative of WHO participating at the ICGFI Meeting also stated that maximum doses up to a level of 30 kGy were required in the treatment of spices and in this regard, the Meeting especially noted that no objections were raised as to the safety of food irradiation during the adoption of the Codex Standard.

¹ Additional information concerning the results of the most recent 20th Meeting of the International Consultative Group on Food Irradiation is contained in Section F of this Newsletter.

² ALINORM 03/12A, paras. 70-78.

³ ALINORM 03/22A, paras. 20-21.

In this regard, the delegation of Germany attending the 26th Session of the Codex Alimentarius Commission expressed its objection to the absence of a maximum limit of 10 kGy and stressed the need for further research on the health effects of radiolytic products, especially those formed following the irradiation of fatty foods. However, the delegation of the United States stated that doses of up to 30 kGy were necessary in some cases such as to kill micro-organisms on spices, and that the revised Standard provided adequate controls to limit higher dose irradiation to cases where it was needed and where it would not effect either the wholesomeness or safety of the food. The delegations of Austria, Denmark, Germany, Greece, Hungary, Italy, Mexico, Poland, Spain and Sudan expressed their reservations to the adoption of the Standard but nonetheless, the Revised General Standard for Irradiated Foods was adopted as a final Codex text.⁴

The representative of the Joint FAO/WHO Food Standards Programme participating at the 20th Meeting of ICGFI also noted the following matters discussed at the 26th Session of the Codex Alimentarius Commission:

- Final adoption of the Revised Codex Recommended International Code of Practice for Radiation Processing of Food (CAC/RCP 19-1979, Rev. 1-2003);
- Adoption of General Methods of Analysis for the Detection of Irradiated Foods (ALINORM 03/41, para. 92 and ALINORM 03/23, paras. 61-63 and Appendix VI, part F) in addition to previously adopted General Methods of Analysis for the Detection of Irradiated Foods (CODEX STAN 231-2001);
- Adoption of Working Principles for Risk Analysis for Application in the Framework of the Codex Alimentarius, including Definitions (ALINORM 03/41, paras. 142-146 and Appendix IV);
- Adoption of Principles for the Risk Analysis of Foods Derived from Modern Biotechnology, Guidelines for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants and Guidelines for the Conduct of Food Safety Assessment of Recombinant-DNA Microorganisms (ALINORM 03/41, para. 52); and
- Discussions concerning the Joint FAO/WHO Evaluation of the Codex Alimentarius and Other FAO and WHO Work on Food Standards (ALINORM 03/41, paras. 149-183).

The representative of the Joint FAO/WHO Food Standards Programme also noted the FAO/WHO Electronic Forum on the Provision of Scientific Advice to Codex and FAO/WHO Member Countries (1 October-14 November 2003), which was designed as a consultative process on means to improve the provision of scientific advice to Codex and to FAO/WHO Member Countries.

D. FORTHCOMING EVENTS

Workshops on the Introduction and Implementation of Principles of Good Agriculture Practice (GAP) in the Production of Fresh Fruits and Vegetables

Technical Officer: Arpad Ambrus

The 1st workshop will be held in Bangkok from 2 to 4 December 2003. Participants are invited from Albania, Armenia, Burundi, China, Hungary, India, Indonesia, Iran, Malaysia, Pakistan, Philippines, Romania, Thailand and Vietnam. The workshop will include presentations on principles and discussions related to the practical experiences of the participants.

⁴ The final version of the Revised Codex General Standard for Irradiated Foods (CODEX STAN 106-1983, Rev. 1-2003) is attached as an Annex to this Newsletter

The 2nd workshop will be held in Nairobi, Kenya, from 17 to 19 February 2004 for senior government officials involved in the promotion, introduction and practical application of GAP principles in the production of fresh fruits and vegetables. Nominations may be submitted, together with the detailed Curriculum Vitae of the candidate, through Ministries of Agriculture or the FAO Representative/FAO National Committee.

Prospectuses of the workshops can be downloaded from the Website of FAO/IAEA Training and Reference Centre for Food and Pesticide Control at <http://www.iaea.org/trc>.

FAO/IAEA (RCA) Workshop on Quality Assurance for Irradiation Facilities

Technical Officer: Tatiana Rubio Cabello.

As food irradiation gradually becomes a part of the food industry in the Asian region, there is a growing need to improve the quality assurance aspects of irradiation facilities so that they comply with national, regional and international standards. In order to meet this need, a workshop on Quality Assurance for Irradiation Facilities will be conducted under the RCA (Regional Cooperative Agreement for Asia and Pacific) project RAS/5/042 - Application of Irradiation for Improving Food Safety, Security and Trade.

This workshop will be held at the Institute for the Application of Atomic Energy of the Chinese Academy of Agricultural Sciences in Beijing, China, from 24 to 28 May 2004. The objective of the workshop is to impart knowledge on international quality assurance systems for irradiation facilities. The workshop will consist of lectures, demonstrations and discussions.

Participants in the workshop from the Asian and Pacific region should have knowledge and experience in the operation and maintenance of irradiation facilities used for the treatment of foods and agricultural commodities as well as on quality assurance of irradiation services. The deadline for submission of nominations is 15 March 2004.

E. PAST EVENTS

Workshop on Quality Assurance/Quality Control in Pesticide Formulation Analysis

Technical Officer: Arpad Ambrus

The workshop on Quality Assurance/Quality Control in Pesticide Formulation Analysis (20 October-14 November 2003) was organized in cooperation with the National Institute of Agricultural Science and Technology, Suwon, Republic of Korea. Participants were invited from Bangladesh, Cambodia, China, Costa Rica, Ecuador, Egypt, Ethiopia, Gambia, Ghana, Honduras, Hungary, Jordan, Korea, Niger, Nigeria, Sudan, Uganda, Vietnam, and Zimbabwe.

All participants successfully completed the programme of the Workshop. Their commitment to gain as much knowledge as possible was indicated by the hard work they invested in their studies during the long working days and evenings (from 8 to 18 hours). Their replies to the evaluation questionnaire revealed that 88% rated the programme excellent or good, the training made them professionally more qualified in a great (44%) or sufficient (50%) extent, and they would be able to apply their increased knowledge in their country. The allocated staff of the host institute provided all possible assistance and created excellent conditions for the effective implementation of the programme.

F. REPORT ON ONGOING AND PLANNED COORDINATED RESEARCH PROJECTS (CRPs) AND RESEARCH COORDINATION MEETINGS (RCMs)

Third FAO/IAEA Research Co-ordination Meeting on Classification of Soil Systems Based on Transfer Factors of Radionuclides from Soil to Reference Plants

Technical Officer: Ian Ferris

The 3rd RCM of the CRP on Classification of Soil Systems Based on Transfer Factors of Radionuclides from Soil to Reference Plants was held in Crete, Greece from 22-27 September 2003.

The meeting summarized a large body of information on radionuclide transfer factors (TFs). These are the best descriptors of radionuclide availability and may be used to gauge the effectiveness of crop and pasture countermeasures. Thus the expertise of the CRP participants helped underpin the FAO/IAEA Workshop on a Practical Integrated Approach to Agricultural Countermeasures for Enhancing Food Safety and Security Following a Nuclear or Radiological Emergency.⁵ The Mediterranean Agronomic Institute of Chania (MAICh) served as the ideal venue to take stock of a decade's research and to begin the work of enlarging the framework and encompassing practical agricultural countermeasures.

Overall, the participants made good progress in implementing the workplan and the experimental protocol. TFs were reported on about 20 percent of all 125 soil units and sub-units that were likely to deviate from average for radiocaesium and strontium for reference crops.

Gaps identified by the participants included factors affecting the sorption/fixation of radiocaesium and, to a lesser extent, radiostrontium, across the range of soil types investigated. The 2001 interlaboratory comparison pinpointed specific analytical problems, and fewer laboratories were able to pass the new analytical precision and accuracy criteria compared with the first interlaboratory comparison. Determination of uncertainty was one problem, but there was also evidence of systematic errors.

Use of Irradiation to Ensure Hygienic Quality of Fresh, Pre-Cut Fruits and Vegetables and other Minimally Processed Food of Plant Origin

Technical Officer: Tatiana Rubio-Cabello

Considerable progress has continued in determining the feasibility of using irradiation in these products in order to improve their microbiological quality without affecting their sensorial and nutritional properties.

Irradiation to Ensure the Safety and Quality of Prepared Meals

Technical Officer: Tatiana Rubio-Cabello

Important progress has been made by the participants in order to determine the effect of irradiation in the safety as well as the quality of prepared meals. The 2nd RCM will be held in South Africa, 26-30 April 2004, where the participants will present their progress reports and future research plans.

⁵ Additional information concerning the results of the FAO/IAEA Workshop on a Practical Integrated Approach to Agricultural Countermeasures for Enhancing Food Safety and Security Following a Nuclear or Radiological Emergency is contained in Section H of this Newsletter.

Evaluation of Methods of Analysis for Determining Mycotoxin Contamination of Food and Feed

Technical Officer: David H. Byron

The overall objective of the CRP was to assist national food control authorities and institutions to improve food safety and stimulate international trade in food by identifying and validating time and cost-efficient methods for detection and quantification of mycotoxins.

The evaluation of the CRP has been completed and the results will be published as a TEC-DOC in 2004.

Testing the Efficiency and Uncertainty of Sample Processing for Analysis of Food Contaminants

Technical Officer: Arpad Ambrus

The majority of the participants have performed their tasks satisfactorily and submitted their annual reports. The interim reports on the progress made during the second part of 2003 are being submitted and evaluated.

The 2nd RCM that was planned for Costa Rica in January 2004 has been postponed to the second part of 2004.

Quality Control of Pesticide Products

Technical Officer: Arpad Ambrus

The progress reports of the participants are due in November-December 2003. They will be evaluated and the activities related to the inter-laboratory comparison of the methods will be defined based on the results.

G. RESULTS OF THE 20TH MEETING OF THE INTERNATIONAL CONSULTATIVE GROUP ON FOOD IRRADIATION (ICGFI)

Introduction

The International Consultative Group on Food Irradiation (ICGFI) was formed in 1984 upon the initiative of the Directors General of FAO, WHO and IAEA, who invited Member States to consider forming a consultative Group to further international cooperation in food irradiation. The resulting ICGFI was conceived as an independent body composed of government-designated experts.

The most recent 20th Meeting of the International Consultative Group on Food Irradiation was hosted by the World Health Organization at its headquarters in Geneva, Switzerland, from 7-9 October 2003. The meeting was chaired by Dr. Alicia O. Lustre (Philippines) and co-chaired by Dr. Nurcan Cetinkaya (Turkey). The Meeting was attended by 22 participants from 14 countries, two international intergovernmental organizations (Codex Alimentarius Commission and the Pan-American Health Organization) and observers from five non-governmental organizations.

Opening remarks were provided by Dr. Jorgen Schlundt, Director, Department of Food Safety, on behalf of the Director-General of the World Health Organization, Dr. Lee Jong-Wook. Welcoming remarks were provided by Dr. Elsa Murano, Undersecretary for Food Safety, United States Department of Agriculture. In the absence of an FAO representative at the meeting, Mr. David Byron, Head, Food and Environmental Protection Section, Joint FAO/IAEA Division on Techniques in Food and Agriculture, provided remarks on behalf of the Director General of IAEA, Dr. Mohamed Elbaradei, and the Director General of FAO, Dr. Jacques Diouf.

General Results of the 20th Meeting of the International Consultative Group on Food Irradiation⁶

The 20th Meeting of ICGFI discussed the following general issues:

- Review and adoption of the summary report of the 19th ICGFI Meeting;
- Annual report by the Secretariat on ICGFI supported activities under the 2003 Programme of Work;
- Adoption of the Secretariat's Financial Report;
- Activities of interest to the Meeting arising from the FAO, IAEA, WHO, PAHO, Joint FAO/WHO Food Standards Programme (Codex Alimentarius Commission) and INGOs;
- Adoption of the final revised Codex Standard on Irradiated Foods and the Codex Recommended International Code of Practice for the Radiation Processing of Food;
- Adoption of the final IPPC Standard for Phytosanitary Measures – Guidelines for the Use of Irradiation as a Phytosanitary Measure;⁷
- Finalization of the revised ICGFI Guidelines for the Certification of Foods Irradiated for Non-Phytosanitary Purposes;
- Consideration of the draft Brochure on Shelf-Stable Foods;
- Consideration and adoption of the 2004 Programme of Work and Budget;
- Nominations and selection of the recipient(s) for the Engel Award;
- Pledges of financial and in-kind contributions for the 2004 Programme of Work and Budget; and
- Other business and future work.

Specific Results of the 20th Meeting of the International Consultative Group on Food Irradiation Related to the Consideration of the Proposed International Forum on Food Irradiation

Since the mandate of ICGFI is scheduled to expire in May 2004, the 20th Meeting of ICGFI primarily focussed its discussions on the potential creation of a successor body, i.e. the International Forum on Food Irradiation.

In the absence of an FAO representative at the Meeting, the IAEA Secretariat provided remarks on behalf of the Directors General of both the IAEA and the FAO in the form of a Joint FAO/IAEA Policy Statement on the Future Status of the International Consultative Group on Food Irradiation. The Meeting was informed that both the FAO and the IAEA were of the opinion that in consideration of the great achievements made by ICGFI over the years in helping to establish the safety and wholesomeness of irradiated foods, and in view of the collaborative efforts of ICGFI with the Joint FAO/WHO Codex Alimentarius Commission (Codex) and the International Plant Protection Convention (IPPC) in the finalization of international standards related to irradiation, there was no current justification for the establishment of a successor body to ICGFI, regardless if the body was envisioned to be an intergovernmental body or an expert body attended by

⁶ Additional information concerning specific results of the 26th Session of the Codex Alimentarius Commission related to activities of the International Consultative Group on Food Irradiation is contained in Section B of this newsletter.

⁷ The final version of the IPPC International Standards for Phytosanitary Measures – Guidelines for the Use of Irradiation as a Phytosanitary Measure (No. 18, IPPC, 2003) is available online at <<http://www.ippc.int/IPP/En/ispn.jsp>>

government designated experts. While the international organizations recognized the potential usefulness of food irradiation to improve food safety and public health, it was felt that the next step was the promotion and application of the technology for post-harvest treatment of food through the commercial sector.

In summary, the IAEA Secretariat noted that both the FAO and the IAEA believed that the time had come for the three international organizations, under whose aegis the ICGFI was established, to step aside since the technology had matured and was ready to move forward on its own merit with the active support and participation of the food industry, food trade, irradiation service providers and Member Governments. It was further stated that the proposed areas of activity and functions to be considered by the potential creation of a successor organization to ICGFI 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 TC and other assistance programs of the agencies involved.

In considering the above remarks and the proposed initiative of the ICGFI to create a new International Forum on Food Irradiation, the Meeting noted that the creation of such a body was the sole responsibility of the Member Governments of the sponsoring UN Organizations and therefore, it was not within the purview of ICGFI to propose a successor body. It was also emphasized that the FAO and the IAEA were not in favour of supporting a successor organization that promoted commercial activities. The difficulties in establishing such a body were further noted based on both WHO's opinion that it would not participate in a new organization or be involved in a Secretariat function, and the view of the FAO Conference that new statutory bodies should be created only when they are strictly necessary and that consideration should be given to ad hoc meetings whenever possible.

In noting these discussions and the difficulties in establishing a successor organization to ICGFI, the Meeting decided that a new successor organization would not be created and that prior to the expiration of the ICGFI on 8 May 2004, a Working Group consisting of designated experts from Australia, Belgium, Egypt, New Zealand, Thailand and Turkey would meet in Vienna in early 2004⁸ to discuss and provide advice on:

- The closure of any outstanding activities/obligations of ICGFI;
- Future follow-up activities related to the use of irradiation as a sanitary and phytosanitary treatment;
- Utilization of the remaining ICGFI budget;
- Options or mechanisms for future international cooperation in the field of food irradiation; and
- Any other related issues communicated in writing.

It was further agreed that a report of the Working Group would be disseminated to ICGFI member governments, designated experts and observer organizations in due course.

⁸ The ICGFI Working Group is scheduled to meet at IAEA Headquarters in Vienna from 12-14 January 2004.

H. FAO/IAEA AGRICULTURE AND BIOTECHNOLOGY LABORATORY

Technical Officer: Arpad Ambrus

Mycotoxins Processing Uncertainty

Studies were conducted to estimate the uncertainty and efficiency of sample processing (grinding and sub-sampling) of maize samples.

Laboratories are confronted with the difficult task to withdraw for residue analysis representative 25-50 g analytical portions of milled maize from analytical samples that derive from 15-20 kg laboratory samples, i.e. the usual mass that is taken from a truck of maize, or a boat, according to established sampling guidelines. The on-going study is considering two distinct procedures, namely, dry-grinding and wet grinding (slurry) technique. It is anticipated that results will be useful for establishing the best conditions for handling maize and other cereal samples in order to enhance testing for residue content. This is especially important for mycotoxin testing, where the patchy distribution of mycotoxins in cereals has an effect on the variability of residues and the resulting uncertainty of the analytical procedure. Therefore, the knowledge on the efficiency of sample processing is essential to provide reliable and accurate analytical data.

Mycotoxins Sampling Uncertainty

After the establishment of method performance parameters, including typical recovery, and within laboratory reproducibility and repeatability values, more than 1000 primary samples from Nigeria were tested for Fumonisin FB1 content. Analysis is ongoing. Most of the samples presented residue level above the 1 mg/kg FB1 content. To date, Switzerland is the only country that has set a regulatory limit for fumonisins in maize based foods (1 mg/kg), and recommended limits are available for feeds in the USA (horse feed 5 mg/kg, pig feed 10 mg/kg, cattle feed 50 mg/kg). Analysis of the results will be carried at the end of the laboratory phase in order to estimate the uncertainty of sampling.

Fellowship Training

Training of a fellow from Malaysia on pesticide residue analysis, planning field studies and evaluation of the results has been completed. A fellow from Hungary continues to work on problems related to the determination of pesticide residues in soil, including the estimation of uncertainty of sampling, elaboration of effective and reproducible procedures for processing soil samples and validation of a new multi residue method.

Internship and Scientific Visits

Scientific visitors from Croatia and Hungary joined the Agrochemicals Unit for a 4-6 week period to perform studies on the efficiency of sample processing and stability of pesticide residues in tropical crops such as jackfruits, papaya and star fruit by applying labelled chlorpyrifos as an internal standard. These studies will also provide information for estimating maximum residue levels of pesticides in the tested commodities.

Three interns from Italy and Turkey are performing studies during the period of July-December 2003 related to the analysis of fumonisin FB1 in maize, pesticide residues in cabbage, cucumber and star fruit, and internal QA/QC related to the analysis.

Internal Training Programme

In order to systematically introduce the underlying theory of procedures and actions related to the analysis of pesticide residues in food and soil and mycotoxin residues in food, fellows studying at the Agrochemicals Unit attended internal seminars that were regularly held during the second half of 2003. The subjects of the seminars included:

- | | |
|--|----------|
| • Statistical methods for evaluation of results | 10 hours |
| • Estimation of uncertainty of analytical measurements | 10 hours |
| • Principles of method validation and performance verification | 6 hrs |
| • QA and QC in pesticide and mycotoxin residue analytical laboratory | 8 hrs |
| • Principles and practice of sampling | 3 hrs |
| • Planning and optimisation of experiments and analytical procedures | 4 hrs |
| • Evaluation of residue data for establishing MRLs | 3 hrs |

I. NUCLEAR PREPAREDNESS

A total of 42 participants from 20 countries attended the FAO/IAEA Workshop on a Practical Integrated Approach to Agricultural Countermeasures for Enhancing Food Safety and Security Following a Nuclear or Radiological Emergency (Crete, Greece, 28 September 2003) with representation from all regions except Africa and North America. In addition to scientists and social scientists, technical experts participated from the FAO, the IAEA Departments of Nuclear Energy, Nuclear Safety and Technical Co-operation as well as the Chernobyl Forum.

Feedback from the participants indicated that the first FAO corporate initiative was successful and more importantly FAO was now in a position to offer its good offices to the Member States and States Parties to meet obligations under the early notification and assistance conventions as set forth in the JPLAN⁹ and the FAO/IAEA Arrangement¹⁰.

Outcomes of the workshop include:

- Endorsement of the STRATEGY templates¹¹ to jump start emergency preparedness on agricultural countermeasures in developing countries;
- Agreement on the need to harmonize practical agricultural countermeasures and derived intervention levels with those in, or being developed for, the Agency's basic safety series;
- Recognition of the importance of Member States becoming parties to the early notification and assistance conventions and improving emergency preparedness for nuclear or radiological emergencies impacting agriculture or food exports;
- Acknowledgement of the importance of monitoring capacity and expertise for determining radionuclides *in situ* and in representative samples;
- Expressions of interest by several developing countries in applying STRATEGY and developing case studies; and
- Agreement that a series of national case studies should be developed with links to the relevant STRATEGY templates.

⁹ Joint Radiation Emergency Management Plan of the International Organizations, EPR-JPLAN (2002)

¹⁰ Co-operative arrangements between FAO and IAEA for information exchange and technical support in relation to food and agriculture in the case of a nuclear or radiological emergency

¹¹ <http://www.strategy-ec.org.uk/cms/countermsrs.htm>

Knowledge gaps/deficiencies identified by the workshop included:

- Uncertainty about the physicochemical mechanisms governing radionuclide behaviour and effectiveness of agricultural countermeasures;
- Lack of knowledge about the effectiveness of agricultural countermeasures under a wider set of environmental conditions and time scales, especially practical countermeasures for commercial fruits;
- Lack of agricultural countermeasures for radionuclides other than radiocaesium and strontium;
- Difficulties in optimising countermeasure strategies, especially when two or more are applied simultaneously;
- Lack of user friendly decision support tools that may be applied by developing countries;
- Lack of funding to implement practical agricultural countermeasures in developing countries;
- Absence of a mechanism to generate new countermeasures for radionuclides, other radiocaesium and strontium and for a range of scenarios of environmental contamination.

J. WEBSITES

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

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

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

K. PUBLICATIONS

Ambrus, A., Hamilton, D.J., Kuiper, H.A. and K.D. Racke. 2003. Significance of impurities in the safety evaluation of crop protection products. *Pure Appl. Chem.* 75: 937-973.

Ambrus A. Reliability of measurement of pesticide residues in food (accepted for publication in *Accred. Qual. Assur.*).

Soboleva E., Ambrus A. and O. Jarju. Estimation of uncertainty of analytical results based on multiple peaks. *Journal of Chromatography A.* (accepted for publication in *J. Chromatogr.*)

Skidmore, M.W. and A. Ambrus. 2003. Pesticide metabolism in crops and livestock. Hamilton D.J. and Crossley S. (eds). *Pesticide residues in food and drinking water: Human exposure and risks.* Chapter 3, John Wiley & Sons, pp. 63-120.

Hamilton, D.J., Ambrus, A., Dieterle, R.M., Felsot, A., Harris, C., Holland, P.T., Katayama, A., Kurihara, N., Linders, J., Unsworth, J. and S.S. Wong. 2003. Regulatory limits for pesticide residues in water, *Pure Appl. Chem.* 75: (8), pp. 1123-1155.

Hamilton, D.J., Ambrus, A., Dieterle, R.M., Felsot, A., Harris, C., Petersen, B., Racke, K., Wong, S-S., Gonzalez, R. and K. Tanaka. Pesticide residues in food – acute dietary intake, (accepted for publication in *Pest. Management Sci.*).

Maestroni, B., Ambrus, A. and S. Culin S. Uncertainty of sample processing of tomato and olive samples. BCPC Congress proceedings, 1-12 Nov 2003, Glasgow, Scotland, UK, pp. 355-364.

ANNEX

CODEX GENERAL STANDARD FOR IRRADIATED FOODS CODEX STAN 106-1983, Rev. 1-2003

1. SCOPE

This standard applies to foods processed by ionizing radiation that is used in conjunction with applicable hygienic codes, food standards and transportation codes. It does not apply to foods exposed to dose imparted by measuring instruments used for inspection purposes.

2. GENERAL REQUIREMENTS FOR THE PROCESS

2.1 Radiation Sources

The following types of ionizing radiation may be used:

- a) Gamma rays from the radionuclides ^{60}Co or ^{137}Cs ;
- b) X-rays generated from machine sources operated at or below an energy level of 5 MeV;
- c) Electrons generated from machine sources operated at or below an energy level of 10 MeV.

2.2 Absorbed Dose

For the irradiation of any food, the minimum absorbed dose should be sufficient to achieve the technological purpose and the maximum absorbed dose should be less than that which would compromise consumer safety, wholesomeness or would adversely affect structural integrity, functional properties, or sensory attributes. The maximum absorbed dose delivered to a food should not exceed 10kGy, except when necessary to achieve a legitimate technological purpose.¹²

2.3 Facilities and Control of the Process

2.3.1 Radiation treatment of foods should be carried out in facilities licensed and registered for this purpose by the competent authority.

2.3.2 The facilities shall be designed to meet the requirements of safety, efficacy and good hygienic practices of food processing.

2.3.3 The facilities should be staffed by adequate, trained and competent personnel.

2.3.4 Control of the process within the facility should include the keeping of adequate records including quantitative dosimetry.

2.3.5 Facilities and records should be open to inspection by appropriate authorities.

2.3.6 Control should be carried out in accordance with the *Recommended International Code of Practice for Radiation Processing of Foods* (CAC/RCP 19-1979, Rev. 1 - 2003).

¹² High Dose Irradiation: Wholesomeness of Food Irradiated with Doses above 10kGy, Report of a Joint FAO/IAEA/WHO Study Group, Technical Report Series 890 WHO, Geneva, 1999; Safety and Nutritional Adequacy of Irradiated Foods, WHO, Geneva, 1994; and Wholesomeness of Irradiated Food, Report of Joint FAO/IAEA WHO Expert Committee, Technical Report Series 659, WHO, Geneva, 1981.

3. HYGIENE OF IRRADIATED FOODS

3.1 The irradiated food should be prepared, processed, and transported hygienically in accordance with the provisions of the *Recommended International Code of Practice – General Principles of Food Hygiene* (CAC/RCP 1-1969, Rev. 3-1997), including the application of the seven principles of Hazard Analysis and Critical Control Point (HACCP) system where applicable for food safety purposes. Where appropriate, the technical requirements for the raw materials and end product should comply with applicable hygienic codes, food standards, and transportation codes.

3.2 Any relevant national public health requirement affecting microbiological safety and nutritional adequacy applicable in the country in which the food is sold should be observed.

4. TECHNOLOGICAL REQUIREMENTS

4.1 General Requirement

The irradiation of food is justified only when it fulfils a technological requirement and/or is beneficial for the protection of consumer health. It should not be used as a substitute for good hygienic and good manufacturing practices or good agricultural practices.

4.2 Food Quality and Packaging Requirements

The doses applied shall be commensurate with the technological and public health purposes to be achieved and shall be in accordance with good radiation processing practice. Foods to be irradiated and their packaging materials shall be of suitable quality, acceptable hygienic condition and appropriate for this purpose and shall be handled, before and after irradiation, according to good manufacturing practices taking into account the particular requirements of the technology of the process.

5. RE-IRRADIATION

5.1 Except for foods with low moisture content (cereals, pulses, dehydrated foods and other such commodities) irradiated for the purpose of controlling insect reinfestation, foods irradiated in accordance with Sections 2 and 4 of this standard should not be re-irradiated.

5.2 For the purpose of this standard, food is not considered as having been re-irradiated when: (a) the irradiated food is prepared from materials which have been irradiated at low dose levels for purposes other than food safety, e.g. quarantine control, prevention of sprouting of roots and tubers; (b) the food, containing less than 5% of irradiated ingredient, is irradiated; or when (c) the full dose of ionizing radiation required to achieve the desired effect is applied to the food in more than one increment as part of processing for a specific technological purpose.

5.3 The cumulative maximum absorbed dose delivered to a food should not exceed 10 kGy as a result of reirradiation except when it is necessary to achieve a legitimate technological purpose, and should not compromise consumer safety or wholesomeness of the food.

6. POST IRRADIATION VERIFICATION

When required and where applicable, analytical methods for the detection of irradiated foods may be used to enforce authorization and labeling requirements. The analytical methods used should be those adopted by the Codex Alimentarius Commission.

7. LABELLING

7.1 Inventory Control

For irradiated foods, whether prepackaged or not, the relevant shipping documents shall give appropriate information to identify the registered facility which has irradiated the food, the date(s) of treatment, irradiation dose and lot identification.

7.2 Prepackaged Foods Intended for Direct Consumption

The labelling of prepackaged irradiated foods should indicate the treatment and in all aspects should be in accordance with the relevant provisions of the *Codex General Standard for the Labelling of Prepackaged Foods* (CODEX STAN 1-1985, Rev.1-1991).

7.3 Foods in Bulk Containers

The declaration of the fact of irradiation should be made clear on the relevant shipping documents. In the case of products sold in bulk to the ultimate consumer, the international logo and the words “irradiated” or “treated with ionizing radiation” should appear together with the name of the product on the container in which products are placed.

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