

FOOD AND ENVIRONMENTAL PROTECTION

Joint FAO/IAEA Division
of Nuclear Techniques
in Food and Agriculture
and FAO/IAEA Agriculture and
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Vienna



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NEWS LETTER

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FAO Web Page: <http://www.fao.org>

TO THE READER

Dear Colleague,

Significant progress on international standard setting has been made in recent months. Firstly, the Codex General Standard for Irradiated Foods was accepted for amendment at Step 5 by the 33rd Session of the Codex Committee on Food Additives and Contaminants (CCFAC), The Hague, The Netherlands, 12-16 March 2001, by removing the maximum dose limit of 10 kGy. Secondly, the 3rd Session of the Interim Commission on Phytosanitary Measures (ICPM), the standard setting body of the International Plant Protection Convention (IPPC), Rome, Italy, 2-6 April 2001 agreed to develop a new international standard on irradiation as a phytosanitary measure. Finally, the Codex Committees on Pesticide Residues and on Veterinary Drug Residues agreed to accept the Guidelines on Single Laboratory Method Validation for further development as their standards. It is expected that all these developments will lead to international standards in respective fields by 2003.

Following a positive development on certification of irradiation as a sanitary and phytosanitary treatment in Asia and the Pacific through a regional workshop held in Sydney, Australia in December 2000 (see details in this issue), another regional workshop on the same subject will take place in Rio de Janeiro, Brazil for the benefit of Latin American countries. A new Co-ordinated Research Project (CRP) on Irradiation to Ensure Hygienic Quality of Fresh, Pre-Cut Fruits and Vegetables and Other Minimally Processed Food of Plant Origin is now being implemented jointly with the Pan American Health Organization. The first Research Co-ordination Meeting (RCM) of this CRP will be held later this year.

Progress made through RCMs on Irradiation as a Phytosanitary Treatment of Food and Agricultural Commodities, on Transfer Factors of Radionuclides from Soil to Reference Plants and on Quality Control of Pesticide Products, held during the past six months, is reported in this issue.

We welcome a new staff member, Dr. Tatiana Rubio (Chile), who joined the Section on 1 March 2001 as a food microbiologist, a return of Dr. Paul Thomas (ICGFI consultant) on 2 April and the arrival of Dr. Josef Brodesser (consultant, pesticide science) on 14 May 2001.

P. Loaharanu
Head,
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A. STAFF

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B. FORTHCOMING EVENTS

ICGFI Workshop for Latin America on Certification of Irradiation as a Sanitary and Phytosanitary Treatment for Food and Agricultural Commodities, Rio de Janeiro, Brazil, 9-13 July 2001

This regional Workshop is convened by the International Consultative Group on Food Irradiation (ICGFI) under its Programme of Work for 2001. It is a follow-up to another regional Workshop for Asia and the Pacific on the same subject held in Sydney, Australia in December 2000. Fifteen senior food control and plant quarantine officials from Latin America are expected to attend. The purpose is to inform these officials of a systematic approach in approving irradiation as a sanitary and phytosanitary treatment for food and agricultural commodities destined for international trade. In particular, the following subjects will be covered:

- Principles of food irradiation
- Irradiation vs comparable processes to achieve similar objectives
- Good Agricultural Practice
- Good Manufacturing Practices
- Food safety and quality vs irradiation
- HACCP Plan
- Irradiation as a sanitary measure
- Irradiation as a phytosanitary measure
- Regulatory aspects of food irradiation
- International Inventory of Food Irradiation Facilities
- End-product testings to verify irradiation treatment
- Process control and dosimetry to ensure compliance with regulations
- Verification of compliances (HACCP Plan, dosimetry, documentation, labelling, etc.)
- Certifying irradiation processing of food for international trade
- Trends on international trade in irradiated food.

Two draft Models on (i) certification of irradiation as a treatment of food other than for phytosanitary purposes and (ii) International Standard for Phytosanitary Measures (ISPM) – Export Certification System of the International Plant Protection Convention will be circulated to selected participants at least one month prior to the Workshop. These documents will provide the basis for consideration and possible adoption by the participants to facilitate the certification process of irradiation of food destined for international trade.

FAO/IAEA (RCA) Workshop on Process Control of Irradiation as a Sanitary and Phytosanitary Treatment for Food, Beijing, China, 6-10 August 2001

This regional Workshop for Asia and the Pacific will be convened under the scope of a regional Technical Co-operation project on “The Application of Irradiation to Improve Food Safety, Security and Trade” (RAS/5/042).

About 15 food and plant quarantine inspectors from countries in this region are expected to attend. The purpose is to provide relevant information on process control of irradiation as a sanitary and phytosanitary treatment for food according to the provisions of the Codex General Standard for Irradiated Foods and its associated Code of Practice and of the International Standard for Phytosanitary Measures of the International Plant Protection Convention, to expedite trade in irradiated food both within and from the region.

C. PAST EVENTS

Second FAO/IAEA Research Co-ordination Meeting (RCM) on Irradiation as a Phytosanitary Treatment of Food and Agricultural Commodities, Fresno, California, USA, 13-17 November 2000

This RCM was hosted by USDA/ARS Horticultural Crop Research Laboratories, Fresno, California. It was attended by 14 scientists from 14 countries who serve as Chief Scientific Investigators of research contracts and agreements under the scope of this CRP. It reviewed progress of work carried out by them in the past 18 months and to plan future work to be finalized before the end of 2002. In addition, the participants were informed of significant developments in the past year on acceptance and application of irradiation as a phytosanitary treatment both in the USA and in several Asian countries. A commercial X-ray irradiation facility in Hilo, Hawaii started operation in July 2000 and has treated the commercial volume of fruits to meet quarantine requirements in the US mainland ever since. Several ASEAN countries are implementing a harmonized protocol on irradiation phytosanitary treatment in the past year. A guideline was drafted to assist the Interim Commission on Phytosanitary Measures to develop an international standard on irradiation as a phytosanitary treatment. These developments together with the USDA/APHIS Proposed Rule on Irradiation as a Phytosanitary Treatment for Imported Fruits and Vegetables, to be finalized during 2001, and the approaching deadline for phasing out the production of methyl bromide in advanced countries under the Montreal Protocol, have heightened interest of many national authorities in irradiation as a phytosanitary treatment. A detailed report of this RCM is available from <http://www.iaea.org/icgfi/>, About ICGFI, Meetings, Past Meetings.

The following significant progress and achievements were made:

1. Work on irradiation phytosanitary treatment of apples against codling moth (*Cydia pomonella*), carried out in Syria, has completed its large scale confirmatory tests using >100,000 5th instars in diet and >32,000 5th instars in apple fruits. The results showed that a minimum dose of 200 Gy prevented adult emergence of this pest, thus meeting the quarantine requirements.
2. Irradiation at a minimum dose of 300-400 Gy showed promise as a quarantine treatment of spider mites (*Tetranychus piercie*) in cut flowers. Irradiation in combination with the registered insecticide abamectin appears promising as a quarantine treatment against thrips (*Thrips palmi*) in orchids. There is a synergistic effect of such a combined treatment as the former is effective for preventing egg hatching and the latter is effective for killing larvae and adults of this pest. Further research is required to determine phytotoxicity of cut flowers irradiated up to a minimum dose of 1,000 Gy.
3. Irradiation appears to be an effective alternative to methyl bromide fumigation of a number of stored products against insects and mites including khapra beetle, Indian meal moth, larger and lesser grain borers and cocoa beans. A minimum dose of 500 Gy resulted either in preventing egg hatch, immediate larvae mortality or sterility of adults.

Second FAO/IAEA Research Co-ordinated Meeting on Evaluation of Methods of Analysis for Determining Mycotoxin Contamination of Food and Feed, Vienna, Austria, 4-8 December 2000

At this RCM, a total of 20 participants presented progress reports and results of work carried out since the first RCM held in Kuala Lumpur, Malaysia in April 1999. The reports covered work related to the improvement of mycotoxin clean-up techniques, analytical methodologies, collaborative studies, to the use of radiolabelled compounds (to assess the mycotoxin distribution in raw and processed foods), all of which generated highly satisfactory results. For clean up of samples, the preliminary results obtained from the re-use tests of the immuno-affinity columns have been confirmed and the findings will soon be published. The results from the first mycotoxin (fumonisin B1, Aflatoxins) pilot studies enabled improvements for the subsequent collaborative studies. As for the first laboratory proficiency test programme, the overall data from the round tests showed a good quality assurance, although some progress is still needed for some laboratories.

The future research topics focused the use of radiolabelled techniques to assess the distribution of fumonisin in processed foods, the development and evaluation of local technology for preparation of immuno-affinity columns with monoclonal antibodies, the development and validation of simple and rapid methods to detect aflatoxins in foodstuffs for use in developing countries. In addition, for prevention, HACCP principles for mycotoxins and mycotoxin decontamination strategies were found to be of great interest.

The overall report of the RCM is available in pdf format at:

<http://www.iaea.org/programmes/nafa/d5/index.html> ("Meetings and Training Courses" and "Research Co-ordination Meetings in 2000" links). The 3rd and final RCM is tentatively planned for Cape Town, South Africa in 2002.

FAO/IAEA(RCA) Workshop for Asia and the Pacific on Certification of Irradiation as a Sanitary and Phytosanitary Treatment for Food and Agricultural Commodities, Sydney, Australia, 18-22 December 2000

The Workshop was organized under the scope of an RCA project RAS/5/032: Irradiation as a Sanitary and Phytosanitary Treatment for Food. The objective of the Workshop was to inform senior food control officials and senior plant quarantine officials of governments which are members of the RCA Agreement of a systematic approach in certifying irradiation as a sanitary and phytosanitary treatment to facilitate trade in food and agricultural commodities. It also considered two draft documents related to certification system of irradiation as a sanitary and phytosanitary treatment prepared specifically for the Workshop, with a view to their adoption by national authorities in Asia and the Pacific.

The Workshop was attended by 45 participants from 12 countries in Asia and the Pacific (Australia, China, Indonesia, Malaysia, Mongolia, Myanmar, New Zealand, Philippines, Singapore, Sri Lanka, Thailand and Vietnam) and representatives of FAO, IAEA and their consultants. It reviewed status of national regulations on food irradiation as related to sanitary and phytosanitary treatment in the region as well as trends of this application on a global scale, certification systems for importing and exporting food of the Codex Alimentarius Commission, Export Certification System and draft Guidelines for Phytosanitary Measures of the International Plant Protection Convention (IPPC), and specific issues related to certification of irradiation as a sanitary and phytosanitary treatment.

The participants agreed that irradiation is a useful technology for the reduction of pathogens of public health significance as part of overall GMP and HACCP systems. It also has other useful applications of significance to the food trade such as delay of ripening and insect control. Certification systems for irradiated foods moving in trade would facilitate increased trade and diversity of food supply. With regard to phytosanitary measures, irradiation provides another effective option for national plant protection organizations (NPPOs) to use to ensure quarantine security of pests in international trade in fresh horticultural commodities. The participants felt however that provisions of the IPPC Standard on Export Certification System and the draft International Standard on Phytosanitary Measures (ISPM) are applicable also to irradiation. Thus, irradiation introduces no special requirements to be included in phytosanitary measures of the IPPC. Two guidelines for certification of irradiation were endorsed by the participants: (i) Guidelines on certification of irradiation for purposes other than for phytosanitary treatment, and (ii) Certificate for Phytosanitary Measures of the IPPC.

A detailed report of this Workshop is available from <http://www.iaea.org/icgfi/>, About ICGFI, Meetings, FAO/IAEA Meetings.

Summary of the activities of the Codex Committee on Methods of Analysis and Sampling (CCMAS) and Codex Committee on Pesticide Residues (CCPR) related to method validation

As it was reported in the previous issues of the Newsletter, an AOAC-FAO-IAEA-IUPAC International Workshop, Budapest 1999, discussed the principles of single laboratory method validation, and an AOAC-FAO-IAEA-IUPAC Expert Consultation, Miskolc 1999, finalised the '*Guidelines for single laboratory validation of analytical methods for trace-level concentrations of organic chemicals*', which was published in the proceedings of the International Workshop on Method Validation¹.

¹ Fajgelj A., Ambrus A., eds. Principles of Method Validation, Royal Society of Chemistry, Cambridge UK, 2000

At the 23rd Session of The Codex Committee on Methods of Analysis and Sampling, Budapest, February 2001, the recommendation of the Budapest International Workshop on Method Validation was accepted and it was agreed to use the term 'single-laboratory validation' in future documents.

The meeting was informed that the Codex Committees on Pesticide Residues (CCPR) and on Veterinary Drugs Residues in Food (CCVRDF) have initiated a programme to adopt and incorporate the guidelines in their procedures. The representative of AOAC announced that the Technical Committees of AOAC are studying the guidelines to be adopted as AOAC GLs.

A number of delegations supported the FAO/IAEA Guidelines on Method Validation and emphasised that it should not be limited to multi-residue methods. The CCMAS invited CCPR and CCVRDF to consider them further, in order to ensure a harmonised approach throughout Codex for single laboratory validation.

The Working Group on Method of Analysis and Sampling at the 33rd Session of Codex Committee on Pesticide Residues, The Hague, The Netherlands, April 2001, discussed a working document on Revised Guidelines on Good Laboratory Practice in Pesticide Residue Analysis, which incorporates the principles of good analytical practice and the relevant part of the 'Guidelines for single-laboratory validation'. The document is being circulated for comments of the Governments at step 3 of the Codex procedure.

Second FAO/IAEA Research Co-ordination Meeting on Classification of Soil Systems on the Basis of Transfer Factors (TFs) of Radionuclides from Soil to Reference Plants, Vienna, Austria, 12-16 March 2001

The second RCM on this subject was held at the IAEA Headquarters, Vienna, Austria, 12-16 March 2001 and was attended by all 14 research contract and agreement holders. The main emphasis of this meeting was to improve the specificity of radiological assessment models by producing data on transfer factors of radionuclides from soil to plants in a range of soil systems in order to characterize systems in which transfer factors deviate substantially from the average.

All participants provided data on the data sheets which had been distributed in the month prior to the RCM. The data were reported as TF values (transfer values) in (Bq/kg dry crop)/(Bq/kg dry soil of the top 20 cm layer). Some 500 relevant TF values were reported for edible products, the majority of which were for radiocaesium and radiostrontium values. Some data were reported also for radioactive Co, Zn, Ra and others.

Five datasheets referred to sites which were contaminated at least 5 years ago (Brazil, Russia, Japan, Ukraine and USA). The other data were developed from artificially contaminated soils. This difference is important as radionuclides from areas which were contaminated several years ago behave differently from those in recently contaminated soils.

Third Session of the Interim Commission on Phytosanitary Measures (ICPM), Rome, Italy, 2-6 April 2001

The New Revised Text of the International Plant Protection Convention (IPPC) approved by the FAO Conference in November 1997, provides for the establishment of a Commission on Phytosanitary Measures, that would serve as the global agreement's new governing body. An Interim Commission on Phytosanitary Measures (ICPM) was established as an interim measure by FAO until the new Revised Text comes into force and convened an annual regular session. Among the objectives of the ICPM are: a) to establish and keep under review the necessary institutional arrangements and procedures for the development and adoption of international standards; and b) to establish cooperation with other relevant international organizations in matters covered by the Convention.

The third session of this ICPM was held at FAO Headquarters, Rome, Italy, 2-6 April 2001. The representatives of 82 ICPM member countries and 15 international organizations attended the meeting. Its agenda, item III "Suggestions from the members and observations of the Secretariat" included the subject of **Irradiation**, because the IPPC Secretary was aware of several regional and national initiatives to elaborate standards for the use of irradiation as a phytosanitary treatment.

In fact, an important development has occurred in this field in recent years, such as the USDA/APHIS Notice

Policy in 1996, which would permit irradiation as a quarantine treatment against major species of tephritid fruit flies regardless of commodities; the North American Plant Protection Organization (NAPPO) standard (1997); the development of a research protocol and a model of a certification of irradiation as a quarantine treatment for Latin America and the Caribbean countries (1999-2000); USDA/APHIS Proposed Rule on Irradiation Phytosanitary Treatment for Imported Fruits and Vegetables (May, 2000), the AFRA/ARCAL/RCA Inter-Regional Workshop on development of an International Protocol on Irradiation as a Quarantine Treatment for Food and Agricultural Commodities, Tangiers, Morocco (September 2000), and the Workshop for Asia and the Pacific on Certification of Irradiation as a Sanitary and Phytosanitary Treatment for Food, held in Sydney, Australia (December 2000).

The ICPM meeting discussed different criteria for identifying priorities for standard setting and agreed that among the standards to be developed **irradiation had high priority**, so, at the end of this year a Working Group will meet to develop the draft of an International Standard in this matter. The Draft Standard will be reviewed by an Interim Standards Committee before it is sent to all member governments for consultation. Comments from governments will be considered by this Committee and the Draft will be amended accordingly before sending it to the Annual ICPM meeting in 2002.

First FAO/IAEA Research Co-ordination Meeting (RCM) on Quality Control of Pesticide Products, Velence, Hungary, 5-12 May 2001

The objective of the Project is to adapt and validate analytical methods and associated QA/QC procedures for determination of the active ingredient content of a number of pesticide products under the same instrumental operation conditions to increase the output of the laboratories and reduce the cost of the analyses. The extraction of the active ingredients from the products will be carried out with the CIPAC procedures to assure comparable extraction efficiency. The methods elaborated and adapted will be tested and validated within the frame of an AOAC Peer Verified Method Programme.

The first Research Coordination Meeting was organised at the Plant Health and Soil Conservation Station of Fejer County, Velence, Hungary between 5-12 May 2001. The meeting was attended by the contract holders and an agreement holder, Dr. Mark Lee, USA.

The participants discussed and agreed on the work programme for 2001 and 2002. The following pesticide products will be tested.

	Pesticides to be included in the programme				
ANIKOH Musa Ibraahim	Dichlorvos EC Novartis, Dizengoff SaroAgrochem (NIG)	Diazinon 70EC Alphasan Int (NIG) Novartis	Monocrotophos 40SCW Novartis	Atrazine 500SC Novartis	Lambda- cyhalothrin 2.5EC Zeneca
BECQUER Arquimedes	Diuron 80SC	Dimethoate 40EC Pilakin (TAW)	Diazinon 60EC Novartis	Imidacloprid 10WG	Carbaryl 80WP
DAS Sushanta	Chlorpyrifos 20EC United Phosph. (IND)	Butachlor EC Hindustan (IND)	Monocrotophos Denocil (IND)	Cypermethrin 10EC	Parathion- methyl EC (IND)
GONZALEZ COLOMER. Irene Carina	Triadimenol 23EC Bayer	Atrazine 45SC Novartis	Amitraz 21EC Makthesim	Diazinon 58% EC Makthesim	Propiconazole 26.8 EC Novartis
HAN Lijun	Metalaxyl 38WP China	Dimethoate 36EC China	Atrazine 38SC China	Butachlor 50EC China	Cypermethrin 10EC China
KAYA Sevil	Molinate 72EC Novartis	Trifluralin 48EC Aventis	Chlorpyrifos- ethyl 25EC (TUR)	Carbosulfan (TUR). 50EC	Parathion- methyl 36EC Bayer
LANTOS Janos	Cymoxanil/folpet	Methomyl Lannate 20L	Parathion methyl Microencapsulated	Malathion Fyfanon 440 EW	Fenvalerate Sumicidin 20 EC Sumithomo

OH Kyeong-Seok	Isoprothiolane 40EC KOR	Dichlorvos50EC KOR	Iprobenfos (IBP) 48EC 17GR Korea	Butachlor (KOR) 5GR	Etofenprox 20EC KOR
PITIYONT Vinai	Parathion methyl 50EC	Methomyl 40SP	Metalaxyl 25WP	Chlorpyrifos- ethyl 40EC	Alachlor 48EC
TIN Win.	Cypermethrin (ASIATIC) 10EC	Esfenvalerate Sumithomo 5EC	Fenitrothion Sumithomo 50EC	Deltamethrin Zeneca 2.5 EC	Malathion AGSIN 50EC
UY Ma. Esperanza Ms*.	Cypermethrin 5EC Syngenta	Butachlor 60EC Monsanto	Lambdacyhaloth rin 2.5 EC, Syngenta	Deltamethrin 1EC, 2.5EC Syngenta	Carbaryl 85WP Rohn Poulenc
VOUNG Truong Giang Mr.	Dimethoate 40EC	Cypermethrin 5 EC	Fenobucarb 50 EC	Fenitrothion 50EC Sumitomo	Butachlor 600EC

Dr. Mark Lee will assist in testing peak purity, Dr. Zhou Zhiqiang will synthesize relevant impurities and Ms. Dudar will elaborate and provide the recommended chromatographic conditions for the detection of active ingredients.

Laboratories interested in joining the programme as contract or agreement holders may contact the scientific secretary of the project:

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The World Mycotoxin Forum, The international Networking Conference for the Food and Feed Industry, Noordwijk, The Netherlands, 14–15 May 2001

The World Mycotoxin Forum, the international networking conference for food and feed industry, was held in Grand Hotel Huis Ter Duin, Noordwijk, The Netherlands from 14 to 15 May 2001. The main objectives of the forum were: to provide a unique platform for the food and feed industry, regulatory authorities and science; to exchange information and experiences on the various aspects of mycotoxins; to review current knowledge related to mycotoxins in food and feed; and to discuss strategies for prevention and control of mycotoxin contamination ensuring the safety of food and feed supply. Participants and speakers from the food and feed industry, government, supranational organizations, research institutes and academic groups attended the Forum. A poster titled “*Mycotoxins initiatives for food safety and trade*” displaying mycotoxin activities of the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, and IAEA (under a Technical Co-operation Project) worldwide, from 1997. The poster presented at the Forum is available under pdf format at: <http://www.iaea.org/trc/> or <http://www.iaea.org/programmes/nafa/d5/index.html>.

The 23rd Mycotoxin Workshop, Vienna, Austria, 28 –30 May 2001

The twenty third Mycotoxin Workshop held in Vienna, 28-30 May 2001 was organized by the University of Veterinary Medicine, Vienna. The main objectives of this workshop were: to provide scientific and international approaches and findings in the mycotoxin field; to provide information on mycological and molecular genetics on toxigenic fungi and related compounds. The paper titled “*Mycotoxin control for food safety and trade*” gave the various aspects of mycotoxin activities funded and organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, and IAEA Technical Co-operation Project, worldwide, from 1997. The abstract of the paper presented is retrievable at: <http://www.iaea.org/trc/> and the whole paper will be published in *Mycotoxin Research*.

D. STATUS OF EXISTING COORDINATED RESEARCH PROJECTS (CRPs)

Classification of Soil Systems on the Basis of Transfer Factors (TFs) of Radionuclides from Soil to Reference Plants

The second RCM on this subject was held at the IAEA Headquarters, Vienna, Austria, 12-16 March 2001 and was attended by all 14 research contract and agreement holders. The main emphasis of this meeting was to improve the specificity of radiological assessment models by producing data on transfer factors of radionuclides from soil to plants in a range of soil systems in order to characterize systems in which transfer factors deviate substantially from the average.

All participants provided data on TF values (transfer values) in (Bq/kg dry crop)/(Bq/kg dry soil of the top 20 cm layer). Some 500 relevant TF values were reported for edible products, the majority of which were for radiocaesium and radiostrontium values. Some data were reported also for radioactive Co, Zn, Ra and others.

The experimental protocols were reviewed and it was agreed that all soils used in the programme should be classified according to the *World Reference Base for Soil Resources* (FAO, 1998; ISBN 92-5-10441-5) scheme and the dominant clay mineral should be specified.

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

The CRP participants consisting of 13 research contracts, 2 technical contracts and 3 research agreements had achieved considerable progress. With regard to the work plan outlines and timeframes established at the 2nd RCM, most of the activities have started with excellent results reached for the re-use tests and conditions of immuno-affinity columns. The second IAEA/FAPAS proficiency tests were planned to start on 7 May 2001, and the rounds included only 3 out of the following 5 rounds: 1) 0439, AF in peanut powder; 2) 0440, AFM1 in milk; 3) 1712, OTA in green coffee; 4) 2204, DON in maize; and 5) 2205, FB in maize.

Irradiation as a Phytosanitary Treatment for Food and Agricultural Commodities

The second RCM was held in Fresno, California, USA in November 2000 and was attended by all 14 participants of this CRP (see report under Past Events). Considerable progress has been made and the 3rd and final RCM is tentatively planned for Guangzhou, China during the second half of 2002.

Alternative Methods for GC and HPLC Analysis of Pesticide Residues in Cereal Grains

The project reached its final year. The participants have adapted the detection methods and checked their reproducibility. Altogether over 200 pesticides were included and tested within the programme.

To establish the among laboratories reproducibility of the measurements, an inter-comparison sample was prepared and distributed among the participants by the Agrochemicals Unit.

The aim of this study was to verify the applicability of TLC detection methods for screening of samples for unknown pesticide residues.

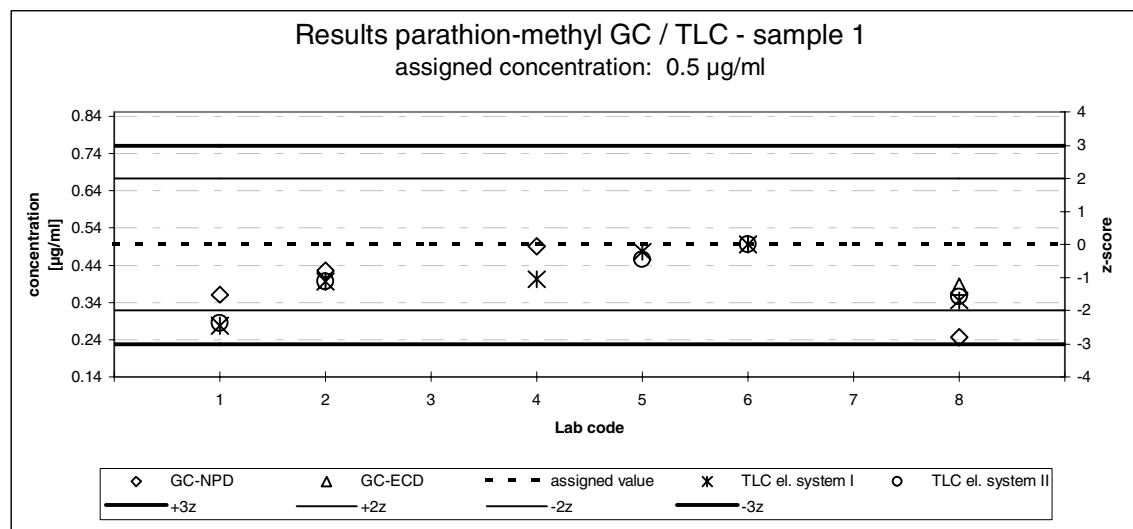
Participating institutions were supplied with synthetic test samples containing different pesticides. The participants were informed that the test samples would contain several pesticide active ingredients out of those tested before. No further information on the nature or number of compounds included in the test samples was given. Laboratories were advised to identify the kind of active ingredients and to quantify by thin-layer chromatography and optionally by gas chromatography, both with optional detection techniques. Finally 8 laboratories returned analysis results in due time to be included into a comprehensive evaluation of the data.

TLC is mainly recommended for screening and confirmation purposes in combination with other chromatographic techniques. The application TLC methodology is preferable for qualitative purposes rather

than for highly precise quantitative determination. Selective GC or HPLC techniques generally are supposed to be capable to provide more accurate results. However, TLC results to a greater extent exhibited a good performance in quantitation as well.

For the compounds studied the reported quantitative results often indicated major differences between the participating laboratories. The correspondence of individual analysis results to the assigned concentration values was mostly satisfying as can be deduced from the individual z-score values as illustrated with the examples of atrazine and parathion-methyl. The charts below were constructed with the assigned value and the acceptable standard deviations derived from the Horwitz equation.

Examples of PT scheme z-score evaluation



The study proved that TLC can be satisfactorily used, if applied carefully by experienced analysts, to complement GLC and HPLC measurements.

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

Fresh, pre-cut produce and other minimally processed food of plant origin are often consumed as such (ready-to-eat), without cooking or undergoing a microbial inactivation process prior to consumption. Contamination of fresh, pre-cut produce can occur anywhere along the production and distribution chain. In the past decade, many large food-borne disease outbreaks attributable to consumption of fresh, pre-cut produce were reported in several countries, some of which resulted in thousands of illnesses and many deaths. Several types of pathogenic bacteria and parasites have been involved, such as *E. coli* 0157:H7, *Listeria monocytogenes*, *Salmonella*, *Shigella*, *Aeromonas hydrophila*, *Yersinia enterocolitica*, *Cyclospora cayentanensis*, etc.

Processing food by ionizing radiation is increasingly recognized as an effective method to ensure microbiological safety of food, especially on fresh commodities to be consumed raw or minimally processed. Its effects on inactivating non-spore forming pathogenic bacteria and parasites are well documented. However, little is known about the effect of irradiation on physiological tolerance as well as sensory attributes of fresh, pre-cut produce.

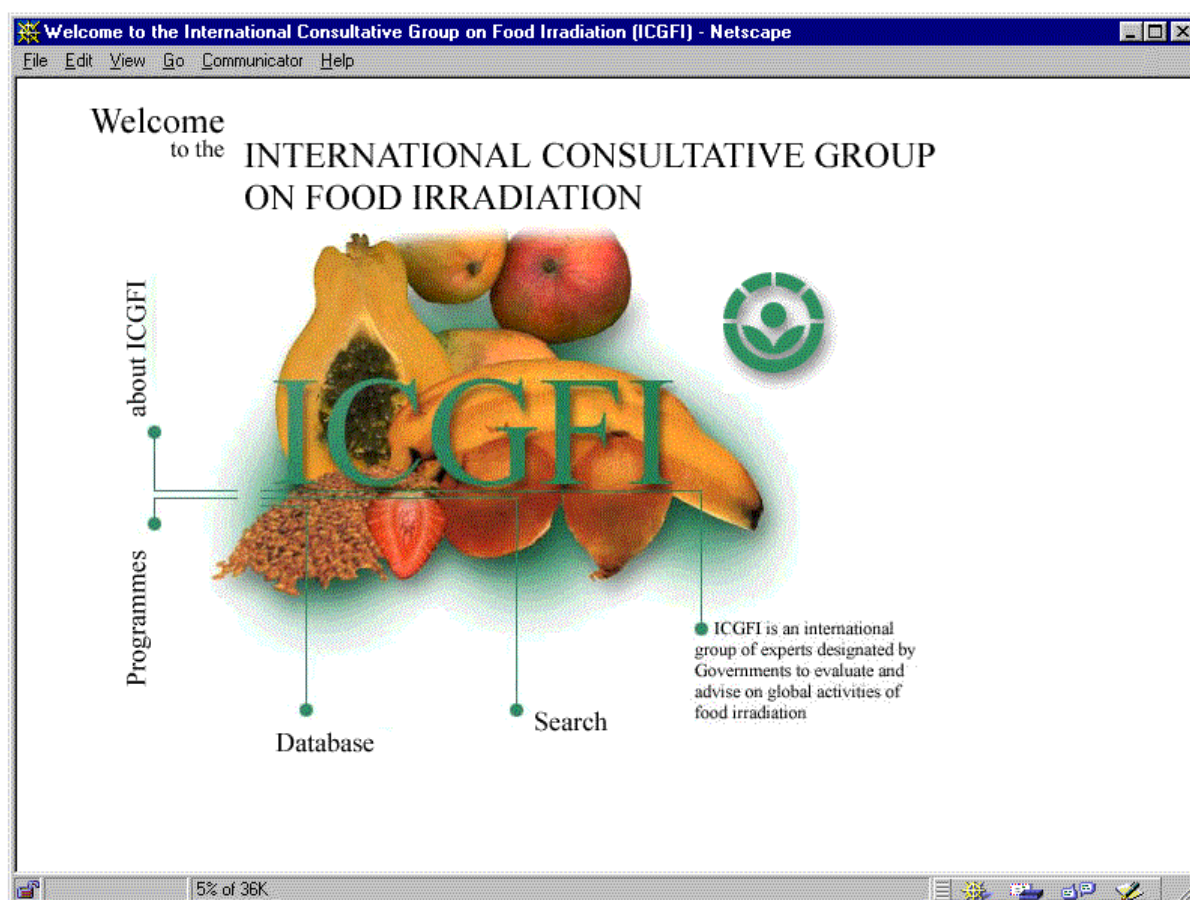
The recently concluded Coordinated Research Project on Irradiation as a Public Health Intervention Measure to Control Vibrio Infection in Food in Latin America (1994-1998) co-sponsored by the Joint FAO/IAEA Division and Pan American Health Organization (PAHO) covered also work on irradiation to control vibrio infection in fresh produce with promising results. Following the recommendations of its participants, PAHO and the Joint FAO/IAEA Division agreed to co-sponsor this new CRP titled "Use of Irradiation to Ensure Hygienic Quality of Fresh, Pre-Cut Fruits and Vegetables and other Minimally Processed Food of Plant Origin".

The overall objective of this CRP is to evaluate the effectiveness of irradiation as a method to ensure microbiological safety of fresh, pre-cut produce and other minimally processed food of plant origin and to appraise the quality of such products subject to radiation doses sufficient to control infectivity of these pathogens.

Up to now there are 10 countries participating in this new CRP and it is expected more countries will be involved in the near future.

E. INTERNATIONAL CONSULTATIVE GROUP ON FOOD IRRADIATION (ICGFI)

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Amendment of Codex General Standard for Irradiated Foods – Excerpt from the 33rd Session of the Codex Committee on Food Additives and Contaminants (CCFAC), The Hague, The Netherlands, 12-16 March 2001

At the request of the ICGFI, the 33rd Session of the CCFAC considered the following matters as its agenda items:

- 9(a) Proposed Draft Revision to the Codex General Standard for Irradiated Food
- 9(b) Proposed Draft Revision to the Recommended International Code of Practice for the Operation of Food Irradiation Facilities Used for the Treatment of Foods.

To both agenda items the following governments had provided written comments: Canada, European Community, Mexico, Philippines, USA, WHO.

9(a) Proposed Draft Revision to the Codex General Standard for Irradiated Food

In view of the recommendation made by the 1999 Report of the Joint FAO/IAEA/WHO Study Group on the safety of foods irradiated to doses above 10 kGy, the 16th Annual Meeting of ICGFI had requested the CCFAC to revise the Codex General Standard for Irradiated Foods and submitted the Proposed Draft Revised General Standard for Irradiated Foods for consideration and adoption. The 32nd Session of the CCFAC held in 2000, having considered comments from various delegations of member countries, decided to request WHO, in collaboration with FAO and IAEA, to revise further the Codex General Standard for Irradiated Foods for circulation.

The 33rd Session of CCFAC generally agreed with the revised document as presented and discussed it section by section. The Committee agreed to revise the text based on the written and verbal comments as well as other minor amendments as discussed at the meeting and forwarded the proposed draft revised Codex General Standard for Irradiated Foods to the Commission for preliminary adoption at Step 5 of the Codex procedure. The delegation of Germany expressed its reservation to this decision.

The text of the proposed draft revised Codex General Standard for Irradiated Foods, as agreed by the 33rd CCFAC, is the following:

PROPOSED DRAFT REVISED CODEX GENERAL STANDARD FOR IRRADIATED FOODS (At Step 5 of the Procedure)

1. SCOPE

This standard applies to foods processed by irradiation. It does not apply to foods exposed to doses 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 radionuclide ⁶⁰Co.
- (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

[The overall average dose absorbed by a food subjected to radiation processing should not exceed 10 kGy. ^{1,2}]

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 wholesomeness or would adversely affect structural integrity, functional properties, or sensory attributes. ²

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 should 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 *High Dose Irradiation: Wholesomeness of Food Irradiated with Doses above 10 kGy, 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*

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

2.3.5 Premises 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 Food (CAC/RCP 19-1979, **under revision**).

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 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 need and is a benefit to consumers or where it serves a food hygiene purpose and should not be used as a substitute for good manufacturing practices.

4.2 **Food Quality and Packaging Requirements**

The doses applied should be commensurate with the technological and public health purposes to be achieved and should be in accordance with good radiation processing practice. Foods to be irradiated and their packaging materials should be of suitable quality, acceptable hygienic condition and appropriate for this purpose and should 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 Section 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 overall average dose absorbed should not exceed 10 kGy as a result of re-irradiation.]

6. LABELLING

6.1 Inventory Control

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

6.2 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. 2-1999).

6.3 Foods in Bulk Containers

The declaration of the fact of irradiation should be made clear on the relevant shipping documents.

7. METHODS OF ANALYSIS AND SAMPLING

To be developed.

9(b) Proposed Draft Revision to the Recommended International Code of Practice for the Operation of Food Irradiation Facilities Used for the Treatment of Foods

The 32nd CCFAC agreed to request the Executive Committee to consider as new work the proposed draft revision of the Recommended International Code of Practice for the Operation of Irradiation Facilities Used for the Treatment of Foods for consistency with the ongoing revision of the General Standard for Irradiated Foods and to incorporate HACCP principles. The 47th Session of the Executive Committee approved the proposed draft revision of the Recommended International Code of Practice for the Operation of Irradiation Facilities Used for the Treatment of Foods as new work. The representative of ICGFI noted that extensive revisions were required because the existing Code emphasized the operation of irradiation facilities rather than food safety aspects and therefore, the title of the Code was revised to "Recommended International Code of Practice for Radiation Processing of Food". The Codex Secretariat indicated that in view of the fact that the title and content of the revised text had been extensively expanded, the elaboration of the new text was subject to approval as new work by the Codex Alimentarius Commission.

In view of the detailed comments received on the draft, particularly from USA and the discussions during the Meeting, the 33rd Session of the CCFAC decided that the Recommended International Code of Practice for Radiation Processing of Food would be revised by the ICGFI based on the discussions and written comments and would be submitted to the Codex Secretariat for circulation, comment and further consideration at the 34th CCFAC. The Committee noted that this initiative would need to be approved by the Commission as new work.

18th Annual meeting of ICGFI, Rome, Italy, 9-11 October 2001

The 18th Annual Meeting of ICGFI is scheduled to be held at FAO Headquarters, Rome, Italy, 23-25 October 2001. An important Agenda item of this meeting will be the consideration of the Extension of the Mandate of the ICGFI for two final years and the new direction of international cooperation in the field of food irradiation as well as its new areas of activities.

ICGFI/IUFoST Symposium on Food Irradiation; Meeting International Trade Requirements, Seoul, Republic of Korea, 23 April 2001

This Symposium was co-sponsored by the International Consultative Group on Food Irradiation (ICGFI) and the International Union of Food Science and Technology (IUFoST) and held during the World Congress of Food Science and Technology, Seoul, Republic of Korea, 23-27 April 2001. The Symposium was held

concurrently with four others on 23 April and attracted about 200 registrants. It provided the global status of development of irradiation to meet international trade requirements according to the following programme:

Chair: Paisan Loaharanu (Joint FAO/IAEA Division, ICGFI Secretariat, Vienna)
Co-Chair: Dr. Byun (Korea Advanced Energy Research Institute, Republic of Korea)

1. Global status of irradiation as a sanitary and phytosanitary treatment for food
(P. Loaharanu, ICGFI Secretariat)
2. Regulations and application of food irradiation in Asia and the Pacific
(A. O. Lustre, Director, Food Development Centre, Philippines)
3. Current situation on food irradiation in Europe
(D. Ehlermann, Federal Research Centre for Nutrition, Germany)
4. Current application of food irradiation in the USA
(M. Cashman, Vice President, International Affairs, Titan Corp., USA)
5. Improving the public understanding of irradiated food
(Hak-Soo Kim, Department of Mass Communication, Sogang University, Korea)
6. Educating the public on food irradiation through health professionals
(C.M. Bruhn, Director, Center of Consumer Science, University of Calif., Davis, Calif., USA)

F. NEW APPROVAL OF IRRADIATED FOOD/FOOD IRRADIATION

European Union

The European Parliament and the Council of the European Union have adopted the Directive 1999/3/EC of the European Parliament and of the Council of 22 February 1999 on the establishment of a community list of foods and food ingredients treated with ionizing radiation. Foodstuffs authorized for irradiation treatment are dried aromatic herbs, spices and vegetable seasonings to a maximum overall average absorbed radiation dose of 10kGy.

As per the Directive 1999/2/EC of the European Parliament and of the Council of 22 February 1999 on the approximation of the laws of the Member States concerning foods and food ingredients treated with ionizing radiation, Member States shall bring into force their laws, regulations and administrative provisions to comply with this Directive in such a way as to:

- permit the marketing and use of irradiated foodstuffs by **20 September 2000** (so far, limited to herbs, spices and dried vegetable seasonings) ,
- prohibit the marketing and use of irradiated foodstuffs not complying with this Directive by 20 March 2001.

Among the 15 Member States of the European Union, Belgium, Denmark, Finland, France, Italy, The Netherlands, Spain and United Kingdom have national regulations permitting irradiation of specific food items. According to the Directive 1999/2/EC, other Member States of the EU such as Austria, Germany, Greece, Luxembourg, Portugal, Ireland and Sweden, will have to permit the marketing and use of irradiated foodstuffs.

Brazil

Brazil has approved food irradiation **as a process without maximum dose limit**. Resolution-RDC n° 21, of 26 January National Register of 29/1/2001 states "Any food can be treated by radiation when the following conditions are observed:

- a) The minimum absorbed dose must be sufficient to achieve the intended objective
- b) The maximum absorbed dose must be less than that which would compromise the functional properties or the organoleptic attributes of the food".

With this legislation Brazil is the first country to adopt the 1999 Report of a Joint FAO/IAEA/WHO Study Group on High Dose Irradiation (WHO Technical Report Series 890), which concluded that foods treated with doses greater than 10 kGy can be considered safe and nutritionally adequate when produced under established Good Manufacturing Practices. Also, the Brazilian legislation conforms to the Proposed Draft Revised Codex General Standard for Irradiated Foods (see Section E).

USA



The Food and Drug Administration (FDA) has amended the food additive regulations to provide for the safe use of ionizing radiation for the **reduction of *Salmonella* in fresh shell eggs**. The Final Rule published in the Federal Register/ Vol.65, No.141/July 21, 2000, pages 45280-45281, 21 CFR Part 179 [Docket No. 98F-0165] permits irradiation on fresh shell eggs at levels not to exceed 3.0 kGy.

Also, the Food and Drug Administration (FDA) has amended the food additive regulations to provide for the safe use of ionizing radiation **to control microbial pathogens in seeds for sprouting**. The Final Rule published in Federal Register/ Vol. 65, No. 210/October 30, 200, pages 64605-64607, 21 CFR Part 179 [Docket No. 99F-673] permits irradiation for control of microbial pathogens on seeds for sprouting at levels not to exceed 8 kGy.

G. THE FAO/IAEA TRAINING AND REFERENCE CENTRE FOR THE CONTROL OF FOOD AND PESTICIDES (TRC)


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Training Workshops

A Training Workshop on **Testing the Quality of Commercial Pesticide Products** was organised at the Plant Health and Soil Conservation Station of Fejér County, Velence, Hungary between 17 April - 5 May 2001. The workshop was attended by 20 participants from 18 countries. The objectives of the workshop were the introduction of the concept of multi-pesticide analytical procedures, advanced laboratory methodology, instrumental techniques used in the analysis of pesticide formulations and elements of quality control/quality assurance of the analytical procedures and laboratory operations.

The programme comprised of lectures explaining the principles and related theory of operation. The lectures were complemented with extensive laboratory exercises in subgroups of 4 analysts, elaboration of worked examples and consultation. Topics (both theory and practice) covered were: FAO specification of pesticide products; Practical importance of various quality parameters; Current status of pesticide formulations, future trends; Significance of impurities, safety evaluation of pesticides; Sampling and sample preparation; Testing physical properties of various formulations; Use of TLC for screening unknown products; Qualitative and quantitative determination with GLC, HPLC, and UV-VIS spectrophotometry, GC-MS; Introduction of multi-pesticide analytical procedures; Basic maintenance and trouble-shooting of analytical instruments and equipment; Statistical evaluation of the results of measurements; Estimation of uncertainty of the measurements, expression of results; Reporting and interpretation of the results in view of legal limits; Basic principles of quality assurance/quality control in pesticide formulation laboratories; Requirements of ISO Guide 25, preparation and use of QM and SOPs; and Principles of method validation. The participants were provided with both the hard copies and the electronic copies of the lectures, laboratory exercises and a number of useful background information.

Future Training Workshops

The workshops on advanced pesticide residue analysis, quality control of pesticide products will be continued in 2002. The exact date and place will be announced in the Newsletters and on the Home-page of the TRC (www.iaea.org/trc/). Nominations may be submitted by the Heads of nominating institutions through the FAO

Representative, FAO National Committee or National Atomic Energy Authority.

Application forms may be requested from, and the nominations together with the completed questionnaire and Language Proficiency Certificate, issued by a language school, cultural institution or the British Embassy, should be sent to:

Mr. Arpad Ambrus
Head, Agrochemicals Unit
FAO/IAEA Agriculture and Biotechnology Laboratory
A-2444 Seibersdorf, Austria
Fax: +43-1-260028222, E-mail: A.Ambrus@iaea.org

Regional Training Workshop on Development of Quality Assurance for Mycotoxin Determination in Food and Feed, for Near East/Africa, Cairo, Egypt, December 2001

The Food and Agriculture Organization (FAO) of the United Nations and the International Atomic Energy Agency (IAEA), through their Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, will organize a Training Workshop in Cairo, Egypt during the first half of December 2001. The selected training venue will be communicated ahead of time.

The Training Workshop will consist of theoretical lectures, practical group exercises, case studies and quality assurance in mycotoxin analysis: i) to provide participants with general quality assurance principles and give theoretical and practical training in the implementation of Guide ISO 25 and GLP, and ii) to enable mycotoxin control laboratories in compliance with the requirements in international trade by establishing a quality system and obtain reliable analytical results necessary for accreditation.

The subjects to be covered during the workshop will include: General principles of quality assurance; ISO Guide 25; Good Laboratory Practices (GLPs); Document and manual preparation; Personnel qualification; Method validation: statistical tools and techniques; Proficiency studies; Traceability of standards and results; Reference materials; Equipment calibration; and Accreditation procedure by certified bodies.

Participants including scientists with ample experience in mycotoxin analyses, head analysts and/or quality assurance officers working in official laboratories responsible for the control of import and export food, from Near East and African countries will attend the workshop. The participants will be provided with handouts, documents, guidelines, and exercise materials. Oral presentations will be given, practical audits conducted and a final examination passed by the participants. The organizers will deliver certificates.

International Food Contaminant and Residue Information System (INFOCRIS)
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Food Contaminant and Residue Information System



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INFOCRIS has now been online for 18 months addressing a wide range of issues about the analysis of food contaminants and residues. The system has proven reliable and robust. In response to a request from editors, a training manual was prepared (<ftp://ftp.iaea.org/dist/rifa-trc/infocris-editor-man1.pdf>). Training and data acquisition are now the priorities. Three training courses were given during 2000 in Vienna. In the first half of 2001, editor training was given in Germany at the Institute for Ecological Chemistry, Federal Biological Research Centre for Agriculture and Forestry, Berlin and the Botany Department, TU-München, Freising-Weihenstephan.

INFOCRIS is a dynamic system that depends on individuals and institutions sharing information. INFOCRIS consultants advocated the addition of new features to build up a “critical mass” of information and, where possible, implement editors' suggestions. Most recently, a “Frequently Ask Question” or FAQ module was added to INFOCRIS. This resource module helps users with analytical queries and provides tips about the system. INFOCRIS is evolving to meet demands for remote training and better access to information resources about food contaminants and residues. Important revisions were made to the Glossary, Slide Shows and MVRS. If you have not logged on recently, please do so and check out these features. MVRS is set to become an indispensable resource for analysts. Like all of INFOCRIS resources, the underlying premise is that everyone wins by publishing and sharing analytical data.

INFOCRIS is offered as a public service via the Internet and may be distributed by CD-ROM. All components including web browsers and plugins are free. For more information check the TRC website (<http://www.iaea.org/programmes/rifa/trc/plugin.htm>). Editors of chemical entities are requested to provide structural information. ChemSketch 4.5 is used by many laboratories for this purpose and is one of a growing number of excellent freeware tools available to support analysts. The program is intuitive but supported with good training material available in English, Japanese and Chinese from the website (<http://www.acdlabs.com/download/chemsk.html>). Analysts are requested to provide structural information in PDB format or MDL Mol-file format for ChemSketch users.

If your laboratory has method validation data or editors are willing to contribute information about food contaminants and residues, contact the system administrator (I.G.Ferris@iaea.org).

H. PUBLICATIONS

Irradiation for Food Safety and Quality (P. Loaharanu, P. Thomas, eds.) Proceedings of an FAO/IAEA/WHO International Conference on Ensuring the Safety and Quality of Food through Radiation Processing, Antalya, Turkey, 19-22 October 1999.

Standardized Methods to Verify Absorbed Dose in Irradiated Food for Insect Control, IAEA-TECDOC-1201, March 2001. Proceedings of a final Research Co-ordination Meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and held in Cascais, Portugal, 30 March-3 April 1998.

Irradiation to Control *Vibrio* Infection from Consumption of Raw Seafood and Fresh Produce, IAEA-TECDOC-1213, April 2001. Results of a co-ordinated research project organized by the Pan American Health Organization and the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

Consumer Acceptance and Market Development of Irradiated Food in Asia and the Pacific, IAEA-TECDOC-1219, May 2001. Proceedings of a final Research Co-ordination Meeting organized by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture and held in Bangkok, Thailand, 21-25 September 1998.

Fajgelj A., Ambrus A., eds. Principles of Method Validation, Royal Society of Chemistry, Cambridge UK, 2000

Maestroni M, Skerritt J.H., Ferris I.G. and Ambrus A., Analysis of DDT residues in soil by ELISA: an international interlaboratory study, J. Assoc Off. Anal Chem. January/February, 2001

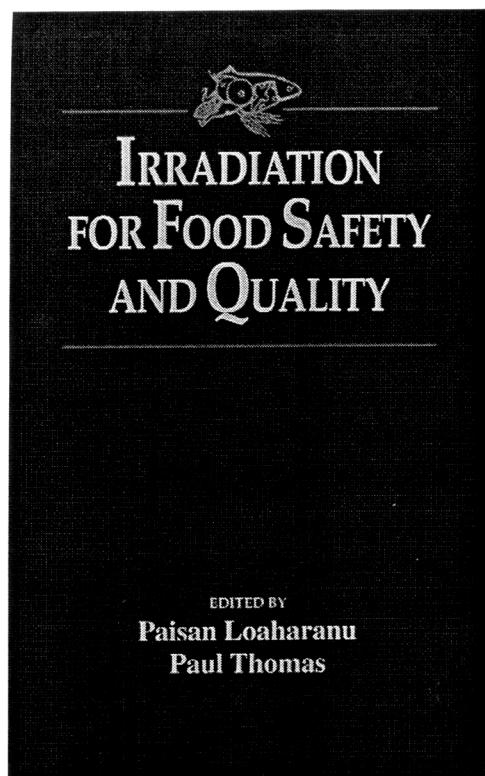
New Food Technology Book

Irradiation for Food Safety and Quality

Proceedings of FAO/IAEA/WHO International Conference on Ensuring the Safety and Quality of Food through Radiation Processing, October 19-22, 1999, Antalya, Turkey

Editors: Paisan Loaharanu, Head, Food and Environmental Protection Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture; Paul Thomas, Consultant, International Consultative Group on Food Irradiation (ICGFI), Food and Environmental Protection Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

- New developments in food irradiation technology for food preservation, safety, and quality
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Food irradiation is increasingly used worldwide as a proven and effective method of food preservation, as well as for improvement of food safety and quality. The International Conference on Ensuring the Safety and Quality of Food through Radiation Processing convened for the presentation of new irradiation technology, and to assess the role of irradiation in ensuring the safety and nutritional adequacy of food of plant and animal origin.

This new book presents the complete texts of all twenty reports from the conference. Examined are applications of the technology in produce, animal products, and prepared foods, the economics of various irradiation technologies, international regulations, the marketing of irradiated products to consumers and retail outlets, and irradiation's implications for the global trade in food and agricultural commodities. Also included is new information on the scientific, regulatory, and consumer acceptance status of food irradiation and the role this technology will play in the 21st century.

The new information in this book will be useful to all those involved in the processing, preservation, and distribution of food, as well as food industry managers and regulatory personnel. To receive your copy promptly, please order now. Information on ordering follows the complete table of contents.

Conference Sponsors and Speakers

This conference was sponsored by three U.N. Agencies: IAEA (International Atomic Energy Agency), FAO (Food and Agriculture Organization), and the WHO (World Health Organization). All authors are leading experts in aspects of food irradiation.

From the Editor's Foreword

"Significant developments on the acceptance and application of food irradiation as a method to ensure food safety and quality and to facilitate food trade have occurred in recent years. Regulations on food irradiation in many countries either have been or are being harmonized based on the Codex General Standard for Irradiated Foods and relevant recommendations of the International Consulta-

tive Group on Food Irradiation (ICGFI). The number of irradiation facilities for treating food is increasing and many more are under construction or being planned. The consumers are getting accurate information and are beginning to appreciate the benefit of irradiated foods.... The potential of irradiation as a method to ensure the hygienic quality of food, especially those of animal origin, as a quarantine treatment of fresh horticultural commodities, and as a substitute for fumigants, is being realized... The Conference reaffirmed the view that the safety and nutritional adequacy of irradiated food produced under conditions of Good Manufacturing Practice is no longer in question, regardless of the absorbed dose."

Contents

Each paper begins with an abstract and ends with a section of references.

Foreword

Summary of the Conference and Its Conclusions

Achievements in Food Irradiation during the 20th Century J.

F. Diehl, Federal Research Center for Nutrition, Germany

Challenges and Opportunities for Food Irradiation in the 21st Century L.M. Crawford, Director, Center for Food and Nutrition Policy, Georgetown University, USA

Harmonisation of Regulations on Food Irradiation in Accordance with the SPS and TBT Agreements P. B. Roberts, Institute of Geological & Nuclear Sciences, New Zealand

Food Irradiation Harmonization in the European Union

H. Vounakis, Principal Administrator, Foodstuffs Unit (E-1) European Commission

Legal and Technological Consequences of the Ongoing Harmonization of Regulations in the Field of Food Irradiation

D.A.E. Ehlermann, Institute of Process Engineering, Federal Research Centre for Nutrition, Germany

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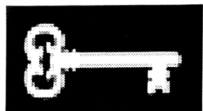


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Irradiation as an Alternative Treatment to Methyl Bromide for Insect Control S. C. Gupta, The United States Department of Agriculture, Animal and Plant Health Inspection Service, USA

Epidemiology of Foodborne Illness—Role of Food Irradiation R. A. Etzel, Director, Division of Epidemiology and Risk Assessment, Office of Public Health and Science, Food Safety and Inspection Service, United States Department of Agriculture, USA

Irradiation: A Critical Control Point in Ensuring the Microbiological Safety of Raw Foods R. A. Molins, Food and Nutrition Board, Institute of Medicine, National Academy of Sciences, USA; Y. Motarjemi, Food Safety Unit, Programme of Food Safety and Food Aid, WHO, Switzerland; F. K. Käferstein, FDA and Food Safety and Inspection Service, USA

Role of Irradiation in a Multiple-Hurdle Approach to Food Safety M. Patterson, Food Science Division, Department of Agriculture for Northern Ireland and The Queen's University of Belfast, Northern Ireland, UK

Reducing Microbial Contamination Including Some Pathogens in Minced Beef by Irradiation I. F. Kiss and L. Mészáros, University of Horticulture and Food Industry, Hungary; H. Kovács-Domján, National Food Investigation Institute, Hungary

Control of Post-Harvest Loss of Grain, Fruits and Vegetables by Radiation Processing P. Thomas, Consultant, Food & Environmental Protection Section, International Atomic Energy Agency, Austria

Modern Trends in Post-Production Technology M. Satin, Chief, Agro-Industries and Post-Harvest Management Service, Food and Agriculture Organization of the United Nations

Low Energy Electron Irradiation of Food for Microbial Control T. Hayashi and S. Todoriki-Suzuki, National Food Research Institute, Japan

Economics of Food Irradiation P. Kunstadt, MDS Nordion, Ontario, Canada

Economics of Machine Sources for Irradiation of Food M. R. Cleland, A. S. Herer and A. Cokragan, Ion Beam Applications, Belgium

United States Consumer Choice of Irradiated Food C. M. Bruhn, Director, Center for Consumer Research, University of California, Davis, USA

Florida: A Case Study in Marketing Irradiated Poultry C. Hunter, Vice President, Business Development, Industrial Irradiation, MDS Nordion, Ontario, Canada

Growing Impact of Irradiation on Global Production of and Trade in Spices M. I. Eiss, Technical Activities Director, American Spice Trade Association

Prospects of Irradiation as a Phytosanitary Treatment of Chilean Grapes T. C. Rubio, Comisión Chilena de Energía Nuclear

Prospects of Radiation Sterilization of Shelf-Stable Food I. DeBruyn, Atomic Energy Corporation of SA, South Africa

43 figures; 19 graphs

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Complete Contents of One Report

Each report includes current, in-depth information on its subject. Here, for example, are the contents of one report.

Modern Trends in Post-Production Technology

• Abstract • Introduction: Primary Causes (of post-harvest losses), Secondary Causes, Magnitude of Losses, Modern Post-Harvest Technologies, Physico-Chemical Post-Harvest Treatments to Control Spoilage, Post-Harvest Cooling, New and Emerging Food Technologies, Food Irradiation, High-Pressure Processing, High Electric Field Pulse (HEFP) Treatment, Ohmic Heating, Pulsed-Light Treatment • Oscillating Magnetic Fields: Minimally Processed Foods, Trends in a Trade, Quarantine Measures, Control of Sprouting and Germination, Shelf-Life Extension of Perishable Foods, Delaying Ripening and Aging of Fruits and Vegetables, Destruction of Parasites, Summary • References

Food and Environmental Protection Newsletter

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