

# **RILARA: Ibero-American Laboratories Network of Radioactivity Analysis in Food**

**M. Lourdes Romero<sup>a\*</sup>, Isis M. Fernandez<sup>b</sup>, Jaime Aguirre<sup>c</sup>, Ana C. de Melo<sup>d</sup>, Yasmine Flores<sup>e</sup>, Amanda Igliski<sup>f</sup>, José M. Osoros<sup>g</sup>, L. Ramiro Vásquez<sup>h</sup>**

<sup>a</sup> Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, Av. Complutense 22, Madrid, España.

<sup>b</sup> Centro de Protección e Higiene de las Radiaciones, Calle 20 No. 4113 e/41 y 47, La Habana, Cuba.

<sup>c</sup> Comisión Nacional de Seguridad Nuclear y Salvaguardias, Dr. Barragán 779, Ciudad de México, México

<sup>d</sup> Instituto de Radioproteção e Dosimetria, Av. Salvador Allende s/n, Río de Janeiro, Brasil.

<sup>e</sup> Dirección de Energía Atómica, Ministerio del Poder Popular para la Energía y Petróleo, Caracas 1010, Venezuela.

<sup>f</sup> Comisión Nacional de Energía Atómica, Av. del Libertador 8250, Buenos Aires, Argentina.

<sup>g</sup> Instituto Peruano de Energía Nuclear, Av. Canadá 1460, Lima 41, Perú.

<sup>h</sup> Comisión Ecuatoriana de Energía Atómica, Juan Larrea 534 y Riofrío, Quito, Ecuador.

**Abstract.** The Ibero-American Laboratories Network of Radioactivity Analysis in Food (RILARA), is a thematic network that was established in the year 2007 with the financial support of the Ibero-American Program of Science and Technology for Development (CYTED). The network brings together laboratories from Argentina, Brazil, Cuba, Ecuador, Spain, Mexico, Peru and Venezuela. The main objective of thematic networks is the transfer of knowledge among the research groups and to foster the cooperation as a working method. Their mission is to create a collaboration framework that allows in the future developing new common actions. The main objective of RILARA is to guarantee the radioactive innocuousness in foodstuffs, to protect consumer's health. Besides, the network aims to facilitate the international trade among Ibero-American countries, by strengthening technical cooperation of radioactivity analysis laboratories in food and by maintaining a continuous exchange of information related to the topic. This paper presents how this network was conceived, its objectives and specific goals. Also actions taken to achieve a stable and continuous interaction among the Ibero-American laboratories controlling radioactivity in food are specified. The completion of these actions is expected to provide technological transfer among countries/Institutions and staff methodology training at developing laboratories.

**KEYWORDS:** *Radioactivity; food; radionuclides; laboratories network; quality assurance.*

## **1. Introduction**

Following the Chernobyl accident and the subsequent appraisal of the consequences to the population, many countries affected by radioactive contamination, were aware of the need to implement relevant normative legislation [1] on food radiological quality. Later on it was also evidenced that the standards should apply not only to post-accident situations but also to normal life conditions, as the monitoring and food control should continuously guarantee to consumers that foodstuffs do not exceed the maximum permitted levels of radioactivity[2], [3], [4], [5].

The increase of international food trade, in particular among Ibero-American countries, has generated the need for harmonization of regulatory standards and consequently the associated technology. In order to assure compliance with standards each country must perform appropriate controls, based on harmonized protocols (analytical procedures, quality systems , etc.), which may lead to prohibiting imports in cases of non-compliance with the maximum permitted levels.

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\* Presenting author, E-mail: lourdes.romero@ciemat.es

Within this context, on January 2007 the RILARA network was established under the financial support of CYTED (Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo), thematic network 107RT0320 [6]. The network is composed of 8 participant countries: Argentina, Brazil, Cuba, Ecuador, Spain, Mexico, Peru and Venezuela, the aim of the project is to improve the quality and control on international food trading among Ibero-American countries and to ensure that radioactivity present in foodstuffs does not compromise environmental or public health.

The main objectives of the RILARA network are the following:

- To establish reliable bases to achieve methodological equivalence among laboratories performing radioactivity analyses in food
- Harmonization of the Quality Management Systems among participating laboratories
- To strength scientific and technical cooperation among the participant countries
- Transfer of know-how and technology to undeveloped laboratories, through continuous training programmes

## 2. Methodology

The planned methodology to comply with the objectives of the project is to develop a system of information among participating laboratories:

- To elaborate specific technical criteria related to radioactivity in food
- Providing technical advise to those countries in need
- To promote continuous training in radiological food control.

Several activities were established to achieve the objectives of the project. These activities are mainly focused on continuous exchange of information among participants. The long-distance distribution of participant countries has led to the use of electronic means to transmit much of the information. The coordination of specific actions is mainly performed via electronic-mail and the diffusion of documents (procedures, standards, minutes of meetings, etc.) is conducted through a website, which has been created specifically for the network development ([www.rilara.com.br](http://www.rilara.com.br)). The design and features of the website are described elsewhere [7], (Figure 1 shows the home page of the website).

- Annual coordination meetings

Besides the continuous contact-coordination via e-mail among participants, the definition of activities, tasks to perform and presentation of the results achieved, are carried out once a year by a coordinators' meeting (which is organised alternatively at the different participant countries). These meetings gather the coordinator of each country and, considering the budget allocated to the project, the activities to perform along the year are established.

- Interregional RILARA Workshops

Once a year, a workshop on the specific objectives of the project is organised (also alternating the different participant countries). The purpose of these workshops is to establish a forum by which scientists, industry and regulatory bodies, working together, can address scientific and technological questions related to the issue. The workshops are conducted with the participation of scientists from every country, and selected specialists on the subject matter are invited from countries more experienced in the field. Seminars constitute a forum for technical discussion among scientists and dissemination of network activities.

- The RILARA website

The website provides scientific and technical exchange among participating laboratories and allows strengthening and promoting the development of the laboratories network. The information contained in the website is easily upgradeable and has been designed with different levels of security access to information, i.e. the publication of documents has to meet the approval of the coordinator of RILARA. The Website has an international spread and, among other options, allows the distribution of procedures for analysis of each country and international norms relating to the topic of study.

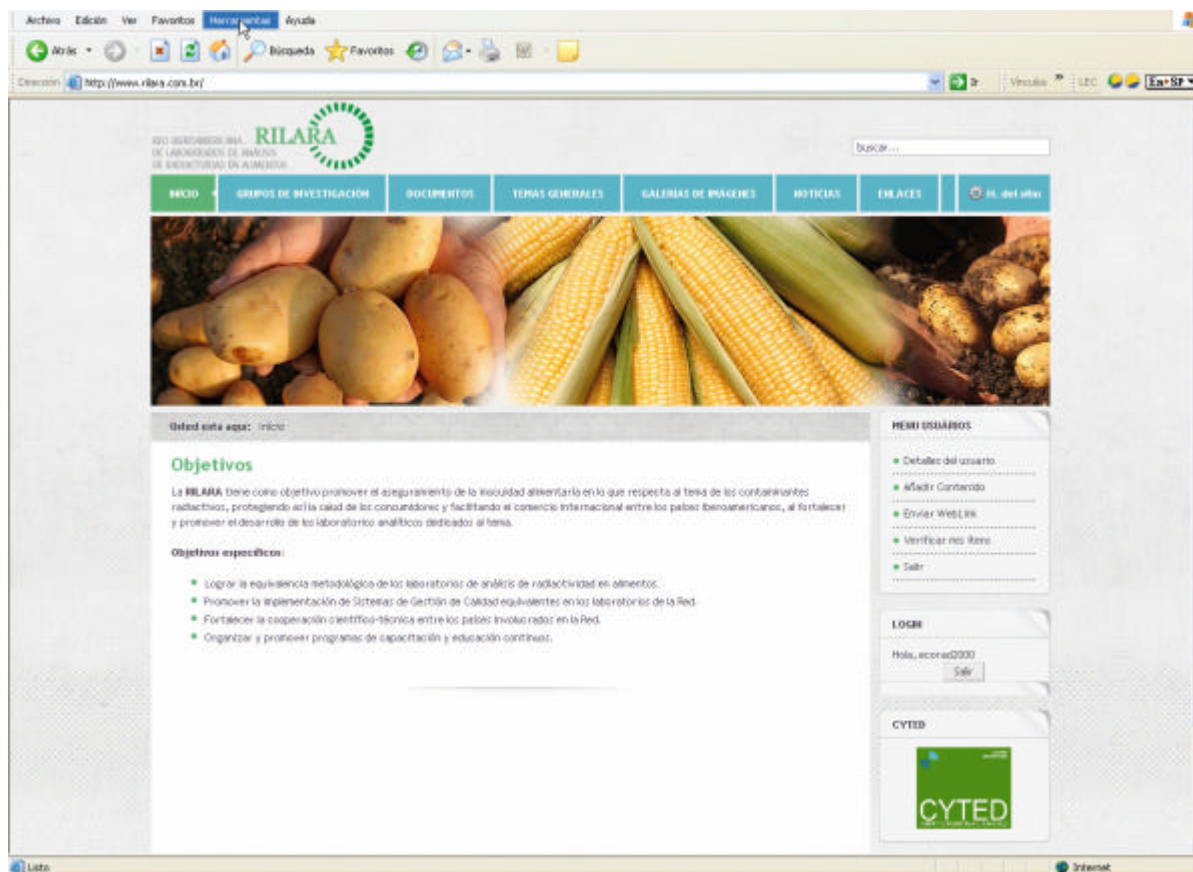


Figure 1: RILARA website home page <http://www.rilara.com.br>

All the relevant analytical procedures and standards have been published into the website (from IAEA project ARCAL LXXIX, calibration systems, evaluation of uncertainties, regulations, etc.)

- CYTED coordinators' meetings

Besides the activities inherent to the network, the financing entity (CYTED) organizes an annual meeting of project coordinators. During these meetings each project coordinator presents the results achieved so far, constituting a forum of scientific exchange among participants. There is a plenary session where main objectives and goals of the different CYTED-actions are presented.

In order to control the quality of the results produced by the RILARA laboratories, the participation in inter-laboratory exercises must be performed every year.

#### 4. Results and discussion

The work developed in the project (after a year and a half of execution) was performed successfully fulfilling all the objectives foreseen.

The first coordinators' meeting was held in Quito (Ecuador) at CEEA (Comision Ecuatoriana de Energia Atómica) headquarters, from 9-13 April 2007. In this meeting the coordinator of each participant country presented their laboratory capacities and the respective national regulations relating radioactivity in food control. Actions to implement the objectives of the network were defined and the budget allowance for the year was set.

It was stated the need to establish an international harmonization of criteria and analytical procedures of radioanalysis in food. Also was evidenced the need to strength analytical capacities in the laboratories at developing stage. Table 1 shows the actual analytical capacity of the RILARA network laboratories.

Group	Type of food	Nuclides
I	Milk and dairy products	H-3 Sr-90 Transuranics Gamma emitters Natural series Isotopic U
II	Meat, fish and eggs	
III	Legumes, nuts and potatoes	
IV	Vegetables	
V	Fruits	
VI	Cereals	
VII	Butter and oils	
VIII	Beverages	

Table 1: RILARA Analytical Capacity of Laboratories

The second year coordinators' meeting was held in Madrid (Spain) at CIEMAT headquarters, from 25-28 May 2008. The meeting consisted of the review of the tasks work progress during 2007-2008, discussion and approval of the schedule of activities for 2008, and the CYTED Technical Report on the 2nd year was prepared. The consolidation of the network was stated and compliance with the objectives set.

The website of RILARA is fully operational and will be continuously improved by feeding it with new information. The site will be internationally diffused in the scientific community through links to international organizations, the IAEA-ALMERA network and disseminated at congresses.

The meeting was linked to attendance at the V Conference on Quality Control of Environmental Radioactivity in Jaca (Spain), from 28-31 May 2008, <http://www.unizar.es/jcalidadjaca/index.htm>.

- Interregional RILARA Workshop,

The first Interregional RILARA Workshop was held in La Habana (Cuba) at the Capitolio (organised by CPHR) from 26 - 30 November 2007. The workshop was attended by 30 participants (external to the network). The outcome of the workshop stated that each laboratory should establish a procedure for evaluating measurement uncertainties and characteristic limits according to international standards [8], [9], [10]. In particular it appeared that each country/laboratory must establish a consensus on the criteria to discard the contributions of uncertainty, that after calculations are not relevant to the total combined uncertainty, once established criterion, the accreditation body must inform the laboratories.

The next RILARA workshop will be held in Buenos Aires (Argentina) hosted by the Comisión de Energía Atómica de Argentina, from 13-17 October 2008.



Figure 2. Interregional RILARA Workshop, La Havana (Cuba)

Training activities carried out in the frame of the network enabled more than 50 scientists be instructed in the determination of radioactivity in food:

- Interregional RILARA Workshop, from 26 to November 30 in La Havana (Cuba)
- Seminar "Ibero-american network Laboratory Analysis Radioactivity in Food", IPEN, Higher School of Nuclear Studies. (Peru)
- Specific training course at the University of Seville (Spain): alpha spectrometry and gamma spectrometry of natural radionuclides in food samples (Ecuador laboratory)
- Specific training course at CIEMAT (Spain): gamma spectrometry and determination of uranium isotopes in food samples (Peru laboratory).

Some of the network laboratories have participated in two international inter-laboratory exercises with satisfactory performance results:

- IAEA-ARCAL (water sample)
- IAEA-ALMERA (water and spinach samples)

The results indicate that laboratories are capable to perform analyses with adequate levels of quality.

Next year it is envisaged to prepare a food test material specific for the RILARA laboratories (maybe in collaboration with the IAEA-Seibersdorf laboratories).

#### **4. Conclusions**

Following the one and a half year execution of the project, the network appears to be fully consolidated and the objectives have been achieved.

The RILARA website has been established as a tool for harmonisation of criteria and analytical methods for determining radionuclides in food, and would contribute to disseminate relevant information to Ibero-american laboratories controlling radioactivity in food.

The development of the project not only has improved laboratories' knowledge on the determination of radioactivity in food, but also provided the implementation of quality management systems in laboratories.

The consolidation of the network over time would constitute a tool to assist food enterprises (import/export), customs management, regulatory bodies for Health and Nuclear Safety, decision makers or accreditation and standardization entities.

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#### **REFERENCES**

- [1] Council Regulation No 3954/87 of 22 December 1987 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feedingstuffs following a nuclear accident or any other case of radiological emergency. (OJ L-371 of 30/12/87 page 11)
- [2] Council Regulation No 737/90 of 22 March 1990 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power-station. (OJ L-82 of 29/03/90 page 1)
- [3] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption

- [4] Council Regulation (EC) No 616/2000 of 20 March 2000 amending Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station
- [5] Commission Regulation (EC) No 1635/2006 of 6 November 2006 laying down detailed rules for the application of Council Regulation (EEC) No 737/90 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power-station
- [6] CYTED, <http://www.cyted.org/Menu8/AccionesConsul.asp?CodAccion=352&Tipo=0>
- [7] A.C. DE MELO et al., Web page of the Ibero-American Laboratories Network of Radioactivity Analysis in Foods: a tool for interregional diffusion". IRPA12, Buenos Aires (Argentina), 20-24 October 2008
- [8] INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, Guide to the Expression of Uncertainty in Measurement, ISO, Geneva, Switzerland, 1995
- [9] ROMERO, M.L., et al., Evaluación de incertidumbres en la determinación de la radiactividad ambiental. CSN. Informes Técnicos 11.2003. ISBN: 84-95341-41-7. Madrid, 2003
- [10] INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, ISO Guide 11929-7: Determination of the Detection Limit and Decision Threshold for Ionising Radiation Measurements, ISO, Geneva, Switzerland, 2005