

EXECUTIVE SUMMARY

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Instituto de Agroquímica y Tecnología de Alimentos (IATA)

1. Strategic Plan

The *Instituto de Agroquímica y Tecnología de Alimentos* (IATA) maintains three departments (Biotechnology, Food Preservation and Quality, and Food Science) which together provide a multidisciplinary approach to a wide range of lines of research within the area of Food Science and Technology. Data for the last five years reflect very favourably on the scientific and technological activity/capacity of the institute which can be considered to be good in relation to other institutions operating within this research area. The IATA continues to have sufficient capacity to capture both public and private financing.

The general scientific objectives of the IATA are to promote and develop competitive research generating knowledge and technological developments related to obtaining safer food of better quality and nutritional value, and to improve food production and preservation processes. These general objectives will be pursued via the implementation of the following specific objectives:

1. Potentiation of the competitiveness of the IATA in research on food safety.
2. Stimulation of the development and application of food processing and preservation techniques.
3. Potentiation of research into the biochemistry, microbiology and biotechnology of foods.
4. Improvement of competitiveness in food quality, and stimulation of research lines on functional foods and nutrition.

The following defined actions will be pursued to attain the specific objectives:

1. Potentiation of the competitiveness of the IATA in research on food safety

1. Methods for the detection and characterisation of emerging pathogenic micro-organisms and micro-organisms that cause food alterations, and stimulation of studies of mechanisms of virulence.
2. Maintain current studies in predictive microbiology and advance in risk assessment.
3. Metal contaminants and their chemical species.
4. Consolidate immunoassay methods for the detection of chemical and biological contaminants.
5. Maintain work on the analysis of residues in meat products.
6. Creation of a cell culture laboratory/unit and access to animal house facilities.

2. Stimulation of the development and application of food processing and preservation techniques

1. Develop processes of food conservation using emerging technologies.
2. Development of new packaging technologies and materials.
3. Development of processes for the obtention of high quality fruit juices.
4. Development of processes for the obtention of high quality meat products.
5. Design of processes for the obtention of new cereal-derived products.
6. Preservation technologies to maintain post-harvest fruit quality.

3. Potentiation of research into the biochemistry, microbiology and biotechnology of foods

1. Maintain studies on enzyme structure/function and molecular engineering, and develop research on antibody engineering.
2. Production of proteins and their application in industrial agro-food processes, and studies of peptides of food interest.
3. Studies on the biochemistry, proteomics and immunology of meat products.
4. Study of dough biopolymers.
5. Metabolic engineering and studies on the molecular mechanisms of adaptation of micro-organisms to agro-food processes.
6. Biotechnological applications of non-conventional micro-organisms.
7. Biotechnological and functional genomics approaches to improve the quality of fruit and vegetable products.
8. Provide the IATA with the resources necessary for conducting high throughput functional genomics.

4. Improvement of competitiveness in food quality, and stimulation of research lines on functional foods and nutrition

1. Analysis of food properties.
2. Sensorial analysis of foods and consumer perception.
3. Studies on the mechanism of action of both probiotics and functional food components.
4. Development of new functional foods.

5. Development of meat products of high sensorial and nutritive quality.
6. Studies on the quality and functional properties of fruit and vegetable products.

2. Actions to Achieve Objectives

In accordance with the specific objectives and each of their corresponding proposed activities, the following table details the scientific profiles of new staff scientist positions/contracts that are deemed necessary to achieve those objectives:

Scientific profile

- Biotechnology of micro-organisms of relevance in the food industry
- Biotechnology of proteins of food technological relevance
- Microbiological food safety
- Application of molecular techniques to food quality and safety
- Chemical contaminants in food
- Physiological effects and development of functional foods
- Evaluation of food allergenicity/toxicology
- Metabolic and nutritional studies of foods.
- Quality and nutrition of cereal derivatives
- Biochemistry of meat products
- Biotechnology of the quality and postharvest storage of plant products
- Food quality and sensorial analysis
- New technologies and processes in food preservation
- New packages and technologies in food packaging
- High throughput technologies in plant products
- Functional genomics and proteomics in foods

In order for the IATA to maintain and improve its research capacity it is equally necessary to provide other human resources. Based on the research activities proposed, the nature of services which should be created and improved, combined with the need to replace personnel of various categories, the following table details the proposed new human resources required for services and research support and their associated functions:

Staff category

- 3 research assistants (upper grade)
- 3 research assistants (lower grade)
- 3 administrative staff
- 8 laboratory auxiliaries
- 3 general services staff

Equipment needs

In order to undertake the activities detailed in the specific objectives it is necessary to renew old and outdated equipment as well as to acquire new equipment, both in the research laboratories and in the pilot plants.

Equipment to be replaced:

- Liquid scintillation counter
- Wine multi-analyser
- Infra-scan
- HPLC Dionex
- Atomic absorption spectrophotometer and HPLC
- Colourimeter and visible spectrum spectrophotometer
- Vacuum packing system
- Installation of air-conditioning in the meat, cereals and post-harvest pilot plants
- CG-MS with atmospheric pressure chemical ionisation interface
- Rheometer with optical microscope incorporated
- Laboratory microwave oven

New equipment required:

- Laser diffraction particle size analyser
- Lyophiliser
- Fluorescence microscope with integrated image capture
- Sterile packaging system
- CO₂ incubator and laminar flow hoods for the cell culture laboratory
- Genomic and proteomic apparatus
- Equipment for the biotechnology pilot plant

Spaces and localization

Two activities which are proposed in the Strategic Plan are the creation of a cell culture laboratory (immunotechnology, functional food research and bioavailability studies) a facility now required by a number of research groups, and secondly a laboratory to house high-throughput technology equipment (genomics, proteomics, and in the future, metabolomics) which will cover the requirements of various research groups and constitute modern techniques of great potential which have begun to be used within the institute. In both cases, certain laboratory equipment is already present thus it is necessary to make space available in these laboratories, preparing them appropriately and completing their infrastructure. The creation of these new shared-use laboratories will make it necessary to redistribute work areas.

In addition, the construction of pilot plant facilities for the Biotechnology Department is desirable, requiring major construction work and investment. Based on the financing available and the necessities of the Biotechnology Department's researchers, efforts will be made to undertake this satisfactorily. Finally, improvements need to be made to the cereals, meats and post-harvest pilot plants.