STRATEGIC PLAN 2005-2009

Estación Experimental de Aula Dei

There is no category of science that can be named applied science. There is science and the applications of science, bound to each other like fruit to the tree that bears it.

Louis Pasteur

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1. GENERAL INFORMATION AND SITUATION IN JANUARY 2005

1. PRESENTATION

1.1.1. Historical review

The Station of Experimental Biology of Cogullada, the precursor to the Aula Dei Experimental Station, was founded on January 20th, 1944. The Council for Scientific Research (Consejo Superior de Investigaciones Científicas, CSIC) accepted an offer for the cession of land located in the Cogullada area, from the Savings Bank "Caja General de Ahorros y Monte de Piedad de Zaragoza, Aragón y Rioja" (CAMPZAR, nowadays known as IBERCAJA). Up to 1948, the provisional facilities of the new Research Station were based at the Technical Architecture School, in downtown Zaragoza. However, the preliminary project to allocate the Experimental Station in the area of Cogullada was soon discarded, due to land acquisition problems. In December 1946, the new project for the Experimental Station was presented as devised for the 4.7-hectare property "La Cartuja", located 13 Km away from Zaragoza and donated by CAMPZAR. The pre-existing buildings were restored and consequently used while the main building was being constructed. In 1948, and due to the proximity to the "Cartuja de Aula Dei" (a XVI Century monastery), the initial name "Station of Experimental Biology of Cogullada" was permanently changed to "Estación Experimental de Aula Dei" (EEAD). In 1952 the final transfer to the new building took place. Over the following years, several buildings were constructed or restored for services and agricultural purposes. The gradual acquisition of adjacent properties for field research purposes was supported by the CSIC, sometimes in cooperation with the "CAMPZAR" (e.g. several properties being acquired in 1949, 1951, 1960 and 1966). Nowadays, the Station has 67 hectares available for field research.

From the beginning, the activities of the Centre were organised by combining basic and applied investigation lines according to prevailing research necessities. Due to a policy of recruiting talented people, it became a national reference centre for Agriculture in Spain with an important social and economic impact. The Agreements with the EU and the Spanish development plans financed outstanding scientific achievements in the fields of Cytogenetics, Pomology, Soil Fertility, and Plant Breeding. Notable milestones were the discovery of the number of human chromosomes by an EEAD researcher (Dr. J.H. Tjio), the enormous contribution of the EEAD to the development of triticale, and the breeding, among many other varieties, of the barley cultivar Albacete, which is the most cultivated variety in the history of Spain. In 1965, the organisational structure of the Station was already quite similar to the current one, counting on the following departments: Genetics and Breeding (with Sections of Cytology, Sugar Beet, Fodder Crops, Cereals and Corn), Pomology, Plant Physiology (with Sections of Biochemistry and Soil Science) and Phytopathology (with a Section of Virology). More recent changes led to the disappearance of the Phytopathology Section, and the creation of the Soil Science and Soil Fertility (later Plant Nutrition) Department.

1.1.2. Location

The EEAD is located on a Campus which congregates a number of research centres devoted to the study of Agriculture, Food Science and Natural Resources. These institutes carry out basic and applied research, knowledge transfer and high-level education. In addition to the EEAD, the main centres of the Campus are the "Instituto Pirenaico de Ecología" (IPE, also a CSIC Institute), the Centre for Agricultural Research and Technology (CITA), Agro-Environmental Laboratory, Centre of Seeds and Nursery Plants, Centre of Agricultural Techniques (all of them belonging to the Government of Aragón, DGA), and the Mediterranean Agronomy Institute of Zaragoza (IAMZ), part of the International Centre for Advanced Mediterranean Agricultural Studies (CIHEAM).

The combined technological and support infrastructures and the existing lines of research within the mentioned institutes makes the Aula Dei Campus one of the leading scientific research complexes in its field in Spain. The good relationship between the Centres and the existence of active collaborations between research groups promotes scientific synergy. The foundation of the EEAD catalysed the appearance of some of these institutes. In 1963, the Agrarian Research and Development Centre of the Ebro River (CIDAE), was created by the Ministry of Agriculture. Its activity was at first carried out in the main building of the EEAD. In 1970, the Centre was integrated into the EEAD as the "Regional Centre for Agricultural Research and Development" Nº 3 (CRIDA 03). In 1981, the CRIDA 03 moved to new facilities within the Campus, and in 1984 it was transferred to the Government of Aragón (DGA), and recently was renamed as "Centre of Agro-Food Research and Technology" (CITA). The IAMZ was the result of an agreement between the Spanish Government and the CIHEAM in February 1970, for postgraduate training in agriculture and environment. At first, it was located in the main EEAD building,

and in 1973 it was transferred to a new building, which had been constructed on the Campus. In 1971 the Ministry of Agriculture created the Regional Laboratory of Agricultural Analyses, also with the involvement of some of the scientific staff of the EEAD. This Centre aimed at controlling the quality of agricultural products. In 1985, the Centre was also transferred to the DGA, subsequently changing its name to "Agricultural Laboratory", and more recently to "Agro-Environmental Laboratory". In 1990 the most recent incorporation to the Campus of Aula Dei, the "Instituto Pirenaico de Ecología" (IPE-CSIC), took place. This Institute has two separate headquarters, one in Jaca (Huesca) and the other is found on the Aula Dei Campus.

This growth and development of the Campus has not stopped, and new projects for improving research and development in the fields of Food, Agriculture and Environment involving the CSIC and the DGA are expected in the future.

1.2. STRUCTURAL DATA AND RESOURCES

1.2.1. Organizational structures

The Aula Dei Experimental Station is an Institute of the CSIC. The management structure includes a Director and a Vice-director, the heads of the four research departments, the Institute's Executive Board and the Scientific Board.

The Director, assisted by the Vice-director, manages and oversees all services and activities of the Centre. The Director delegates specific functions to the Vice-director. The heads of the Departments coordinate and oversee the activities carried out in their departments. The Manager, under the Director's supervision, is responsible for the administrative and economic management of the Centre.

The Institute's Executive Board is made up of 10 members with voice and vote, namely: the president (the Director of the Institute), the secretary (the Manager of the Institute), and eight members (the Vice-director of the Institute, the heads of the 4 research departments and 3 representatives selected by the personnel). Its mission is to inform and advise the Director on issues concerning the functioning of the Centre.

Currently, the Scientific Board has 31 members with voice and vote i.e. the president (the Director of the Institute), the secretary (the youngest doctor to hold a permanent position as research scientist) and 29 representatives (the remaining full time research scientists at the Institute). In addition, all doctors hired on a contract basis, and in some instances doctoral students, are invited to attend the sessions with voice and without vote. This is the forum to discuss scientific issues and strategies.

Departments

There are four research departments:

- Soil Science
- Genetics and Plant Production
- Plant Nutrition
- Pomology

Services

There are two service units, which depend upon the Institute's management:

- Administrative services
- General services

Further units

There are two support units for research purposes, which depend on the Institute's Director:

- The Library and Archives Unit
- The Field Research Support Unit

1.2.2. General infrastructure

Aula Dei Experimental Station is on a property of 76.7 ha of which 11.6 ha are allocated to buildings and gardens, and the remaining land being used for experimental purposes. The property includes the Instituto Pirenaico de Ecología (also from the CSIC), the office of the CSIC Delegate to Aragón, a residence for students and visitors, and the main restaurant.

The EEAD has several facilities. These are: the main building, greenhouses, farm house and premises, cold frame, and two smaller buildings used as general purpose laboratories, one of them currently used for radioactive isotopes, whereas the other one is a laboratory of plant nutrition.

The main building was built on an area of 2,100 m^2, and has three stories and a basement. The basement is 763 m^2, the ground floor 1,129 m^2, the first floor 1,198 m^2 and the second floor is only 195 m^2. The total area used for Administration purposes is 695 m^2, whereas 2,178 m^2 is devoted to research activities (Table 1.2.2.1).

The external facilities (64,591 m^2) are mainly devoted to field research, in particular the 60 ha experimental farm, with 47 ha of irrigated and 13 ha of dryland farming. The distribution of space is indicated in Table 1.2.2.1.

Table 1.2.2.1. Space distribution by usage, departments, and buildings.

BUILDINGS AND OTHER FACILITIES		DEPARTMENTS					
		SOIL SCIENCE	GENETICS AND PLANT PRODUCTION	PLANT NUTRITION	POMOLOGY	GENERAL SERVICES	TOTAL
MAIN BUILDING							
MANAGEMENT	Warehouses	-	-	-	-	26	26
	Administration	10	15	11	9	198	242
	Library	-	-	-	-	341	341
	Maintenance	-	-	-	-	85	85
	Total, Management	10	15	11	9	650	695
RESEARCH	Warehouses	60	79	16	37	-	193
	Offices	124	266	183	106	8	687
	Laboratories	175	450	415	258	-	1.298
	Total Research	359	796	614	401	8	2.178
OTHER AREAS (staircases, corridors, terraces, bathrooms, etc.)		-	-	-	-	-	**2.303**
TOTAL AREA MAIN BUILDING (m^2):							**5.175**
OTHER BUILDINGS AND FACILITIES							
Greenhouses	Greenhouses	-	-	-	-	1.505	1.505
	Service alley, growth chambers, cold storage	-	-	-	-	1.000	1.000
	Total Greenhouses						**2.505**
Farm house	Utilities, warehouses	-	-	-	-	640	640
	Workshop	-	270	-	-	-	270
	Total Farm house						**910**
Farm warehouse	Storage house	-	-	-	-	690	690
	Waste storage	-	-	-	-	57	57
	Total Farm warehouse						**747**
Laboratories	Radioactive isotopes	-	-	-	-	39	39
	Lysimeters	-	-	33	-	-	33
	Total external laboratories						**71**
Farm		-	-	-	-	60.000	**60.000**
Cold frame		-	-	-	-	358	**358**
TOTAL AREA, OTHER BUILDINGS AND FACILITIES (m^2):							**64.591**

Large scientific equipment for common usage at the Institute are listed in Table 1.2.2.2.

Tabla 1.2.2.2. Common equipment, cost over 60,000 euros.

Name	Year	Cost (euros)	Name	Year	Cost (euros)
Electronic microscope	1996	150.253	Drip and sprinkler irrigation system	2001 -02	110.103
GC-MS Chromatograph	1996	84.142	Greenhouse *	2002	168.541
N and S analyzer	1998	68.215	HPLC-MS-TOF *	2002	283.678
Ultracentrifuge	1998	60.937	Flow cytometer	2003	70.294
Photomicroscopy and image analysis system *	1999	63.106	Microarray scanner *	2003	62.242
Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES) *	1999	98.566	RT-PCR *	2003	54.900
Gel analyse and image analysis *	1999	72.121	Low background Germanium detector	2004	65.000
DNA sequencer *	2001	83.541			

* Partially financed with funds from the European Regional Development Fund

Computing facilities at the EEAD are described in Table 1.2.2.3.

Tabla 1.2.2.3. Computing infrastructure

COMPUTING FACILITIES			
NETWORK COMPUTING *		PERSONAL COMPUTING	
Mail servers, DNS	1	Desktop computers	125
Web servers	1	Laptops	25
Intranet servers	1	Printers	75
Backup systems	1	Scanners	15
24-port switches	5	Plotters	2
12-port hubs	1	Projector	1
Voice/data jacks	196	Videoconference equipment	1

*Network computing partially financed with funds from the European Regional Development Fund

1.2.3. Human resources

Human resources of the EEAD, as at January 1st 2005, are presented according to professional categories, departments, services (Table 1.2.3.1), and gender (Table 1.2.3.2). Five- (*quinquenios*) and six-year (*sexenios*) evaluation periods used to assess scientific quality and productivity in the Spanish R+D system are presented in Table 1.2.3.3.

Current human resources correspond to about sixty researchers, half of them being permanent staff, fifty research technicians holding permanent positions, and twenty four people in administration, maintenance, field work, library, and so forth. A total of approximately 150 people work daily at the EEAD, including students undergoing practical training (as the result of several agreements with Universities), as well as temporary workers.

Scientific staff and PhD students at the EEAD have increased remarkably in number over the last years. There were eleven staff scientists in 1985, the number increased to twenty-one in 1995 and to thirty-two in 2005. This growth is evidence of the dynamism of the institute, which we will endeavour to maintain for the period 2005-2009. The number of technicians, however, has remained practically constant over the last five years. This has caused a drop in the technician–to-scientist ratio, which may compromise the growth of the research capacity of the Institute in the near future.

Table 1.2.3.1. Human resources distribution by categories, departments, services, and other units.

HUMAN RESOURCES EEAD (updated January 1st 2005)	INSTITUTE	DEPARTMENTS				SERVICES		RESEARCH SUPPORT	
		SOIL SCIENCE	GENETICS AND PLANT PRODUCTION	PLANT NUTRITION	POMOLOGY	ADMINISTRATION	MAINTENANCE, OTHERS	LIBRARY	FIELD RESEARCH
Scientists, staff	31	4	12	8	7	-	-	-	-
Postdocs	5	-	-	4	1	-	-	-	-
Graduate students	21	2	4	10	5	-	-	-	-
Research support, civil servants	22	3	8	7	3	-	1	-	-
Research support, permanent positions	7	2	4	1	-	-	-	-	-
Research support, temporary contracts	11	1	4	2	4	-	-	-	-
General services personnel	24	1	1	1	1	7	13	-	-
Support units personnel	10	-	-	-	-	-	-	4	6
OVERALL	131	13	33	33	21	7	14	4	6

Table 1.2.3.2. Average age, and gender distribution, by categories.

HUMAN RESOURCES EEAD (updated January 1st 2005)	OVERALL		FEMALE			MALE		
	AGE	no.	AGE	no.	%	AGE	no.	%
Scientists, staff	49	31	46	13	42%	51	18	58%
Postdocs	35	5	35	2	40%	34	3	60%
Graduate students	26	21	27	16	76%	26	5	24%
Research support, civil servants	55	22	54	18	82%	59	4	18%
Research support, permanent positions	48	7	47	5	71%	52	2	29%
Research support, temporary contracts	27	11	27	7	64%	26	4	36%
General services personnel	49	24	49	12	50%	50	12	50%
Support units personnel	45	10	45	3	30%	44	7	70%
OVERALL	44	131	42	76	58%	45	55	42%

Table 1.2.3.3. Overall amount of 5-year and 6-year periods of merit acknowledgement approved.

Personnel	Management *(QUINQUENIOS)*	Research *(SEXENIOS)*
Research Professors	20	15
Scientific Investigators	16	9
Staff Research Scientists	79	36
Scientists, staff	**115**	**60**

1.3. DEPARTMENTS

The personnel distribution per departments and research groups is presented in Table 1.3.

Table 1.3. Staff distribution by departments and research groups.

DEPARTMENT	RESEARCH GROUP	Scientists Staff	Postdocs	Graduate students	Technicians Staff	Technicians Temporary
SOIL SCIENCE	Soil Physics and Conservation Tillage	2	-	1	2	-
	Erosion, and evaluation of soil and water resources	2	-	1	2	-
	Department	-	-	-	2	1
	TOTAL SOIL SCIENCE	**4**	**-**	**2**	**6**	**1**
GENETICS AND PLANT PRODUCTION	Application of tissue culture and development of biotechnology methods for plant breeding	3	-	2	1	2
	Plan breeding and genetics	6	-	2	10	2
	Irrigation, agronomy, and environment	3	-	-	1	-
	Department	-	-	-	1	-
	TOTAL GENETICS AND PLANT PRODUCTION	**12**	**-**	**4**	**13**	**4**
PLANT NUTRITION	Abiotic plant stress physiology	3	2	4	1	1
	Nitrogen fixation and oxidative stress in legumes	1	1	2	1	-
	Photosynthesis: Genomics and proteomics of the chloroplast and its response to abiotic stress	2	1	4	1	-
	Nutrition of fruit crops (split between POMOLOGY and PLANT NUTRITION)	2	-		1	-
	Department	-	-	-	5	1
	TOTAL PLANT NUTRITION	**8**	**4**	**10**	**9**	**2**
POMOLOGY	Developmental Biology and Genetic Resources in Pomology	4	1	1	-	2
	Breeding, selection, and characterization of fruit species	2	-	4	-	1
	Nutrition of fruit crops (split between POMOLOGY and PLANT NUTRITION)	1	-	-	-	-
	Department	-	-	-	4	1
	TOTAL POMOLOGY	**7**	**1**	**5**	**4**	**4**

Department of Soil Science

Its primary target is the study of soil and soil water, from the point of view of management, conservation and rational use for a greater sustainability of agricultural systems. The main objectives of the research groups are:

- **Soil physics and conservation tillage** group (**Ed1**, responsible: J.L. Arrúe). Development of agricultural practices aimed at soil quality improvement and soil degradation control. In order to achieve this objective, the group is currently focusing its research on conservation tillage systems (reduced tillage and no-tillage).
- **Erosion, and soil and water evaluation** group (**Ed2**, responsible: A. Navas). Study of soil and sediment degradation (erosion and contamination) in different physiographic contexts within the diversity of the Mediterranean area, as well as in other highly-fragile areas, (e.g. Antarctic, desert) from the point of view of sustainability and environmental conservation. Soil and water evaluation and properties, in order to achieve a rational use and minimizing adverse environmental impact.

Department of Genetics and Plant Production

The lines of research are focused on developing new plant materials adapted to the prevailing environmental conditions in our area, and to the development of environmental friendly production techniques.

The process of developing high-quality adapted materials starts with the maintenance and exploitation of both native and foreign genetic diversity; and is complemented by the generation of new sources of variability by means of traditional and new techniques, essentially based on mutation, recombinant DNA, tissue culture and transformation. Subsequently, identification, selection and fixation of high-performance genotypes is carried out.

Current and future agriculture demand the implementation of sustainable agricultural systems, regarding both economic and environmental aspects. With this purpose, we focus our efforts on irrigation management improvement, an important issue in

Spain that provides technological support and developing technologies for the most commonly cultivated crops in our area. The main objectives of the research groups are:

- **Application of tissue culture and development of biotechnology methods for plant breeding** group (**GPV1**, responsible: L. Cistué). Optimizing techniques to be used in cereal biotechnology; anther and microspore culture in barley, bread wheat, durum wheat and rice for double haploid production, including technical improvement and studies on genetic control; genetic transformation and mutagenesis.
- **Genetics and plant breeding** group (**GPV2**, responsible: J.M. Lasa). Developing new cereal varieties and improved germplasm adapted to our agricultural conditions.
- **Irrigation, agronomy and environment** group **(GPV3**, responsible: E. Playán). Technical and knowledge development to improve water use efficiency in irrigation systems, minimizing their negative impact.

Department of Plant Nutrition

The aim of the research at the Plant Nutrition Department is to gain an insight into the physiological processes that limit plant productivity in order to obtain higher quality crops with the lowest environmental impact. To achieve this goal we need to know in detail not only the molecular mechanisms of use and uptake of nutrients but, also, the ways to carry out an optimal application of fertilizers. In this sense, it may be possible to increase crop efficiency, minimizing abiotic stress effects and reducing the environmental impact of fertilization practices. The main objectives of the existing research groups are:

- **Plant stress physiology** group (**NV1**, responsible: J. Abadía). To gain a deeper knowledge of plant abiotic stress, with special regard to metal homeostasis (uptake, transportation and storage), studying simultaneously the consequent practical implications (diagnosis, precision fertilization, biofortification, phytoremediation) and using advanced –omics techniques (metabolomics, xenomics, proteomics) and remote sensors.
- **Nitrogen fixation and oxidative stress in legumes** group (**NV2**, responsible: M. Becana). Multi- disciplinary research on model and cultivated legumes, with special emphasis on the role of antioxidants on oxidative and abiotic stress tolerance and beneficial interactions between plants and nitrogen-fixing bacteria.
- **Photosynthesis group: chloroplast genomics and proteomics and its response to abiotic stress** (**NV3**, responsible: R. Picorel). Multi-disciplinary study of plant chloroplasts (essentially soybean and *Arabidopsis*) combining structure and function aspects of photosynthesis and analysis of chloroplast responses to certain abiotic stresses. Research is supported by molecular biology techniques, genomics and proteomics.

Department of Pomology

The Department of Pomology focuses its activity on the study and selection of cultivars and germplasm of stone and pome fruit species. New rootstocks and varieties well adapted to Mediterranean conditions are developed based on the conservation, identification and agronomic evaluation of plant genetic resources. Germplasm and cultivar collections are available for apple, peach, plum and *Prunus* rootstocks, among other species. The application of tissue culture for fruit-tree breeding and the development of plant production systems using *in vitro* culture techniques complement the traditional methods of fruit rootstock breeding and selection. Crop physiology of fruit species is also studied, paying particular attention to fruit set and development, as well as to nutrient competition between organs, with special interest in fruit quality. The main objectives of the research groups are:

- **Nutrition of fruit crops** group (**NVPo**, responsible: A. Blanco). Fruit quality improvement: physiopathy, diagnosis and prevention. Research in cooperation with the Plant Nutrition department.
- **Developmental biology and genetic resources in Pomology** group (**Po1**, responsible: M. Herrero). Knowledge of plant strategies affecting agriculture and the study of fruit-tree materials.
- **Breeding, selection and characterization of fruit species** group (**Po2**, responsible: M. Moreno). Development of *Prunus* rootstocks and peach cultivars adapted to Mediterranean conditions. The maintenance of fruit-tree diversity and characterization studies.

1.4. LINES OF RESEARCH

The EEAD lines of research are focused on the plant and its environment. There are three levels of integration: First, the plant as a complete organism, and its genetic improvement; second, the explanation of fundamental biological processes in plants; and third, the crop and the agro-ecosystem, taking into account plants as well as soil and water. These three levels are linked and taken together cover the major research areas in Agriculture.

Table 1.4 shows the list and description of the most representative research lines of the Institute. The Table also includes the equivalent in terms of total time dedication (EDPs) to the mentioned lines of research from each research group (including permanent and "Ramon y Cajal" contract research personnel).

Table 1.4. EEAD research lines, and number of full-time-researchers devoted to each line.

Lines of research	Research groups											TOTAL
	Ed1	Ed2	GPV1	GPV2	GPV3	NV1	NV2	NV3	NVPo	Po1	Po2	
1 Phytogenetic resources and plant breeding												**14.9**
– Mantaining and exploiting natural genetic variability (biodiversity)				1.7					0.4	1.0	0.5	3.6
– Generating new variability; identification and selection of traits of interest			1.5	1.5						2.0	1.0	6.0
– Development of new plant materials			1.5	2.8						0.5	0.5	5.3
2 Improving the knowledge of plant yield-limiting fundamental processes to optimise our agricultural systems												**14.1**
– Fundamental processes in plants: photosynthesis and nitrogen fixation						0.5	1.0	1.0				2.5
– Physiology of plants under abiotic stresses						0.8	1.0	1.5				3.3
– Optimisation of plant nutrition in a sustainable agriculture context						3.7		0.5	2.6			6.8
– Reproductive biology										1.5		1.5
3 Development of environment friendly agricultural production systems												**7.0**
– Optimisation of soil use, characterization, degradation, and conservation	2.0	1.5										3.5
– Optimisation of water use in irrigated agriculture		0.5			3.0							3.5
TOTAL	**2.0**	**2.0**	**3.0**	**6.0**	**3.0**	**5.0**	**2.0**	**3.0**	**3.0**	**5.0**	**2.0**	**36.0**

1.5. SERVICES

- Administrative services: provide administrative and financial management of the Institute.
- General services: include the service of maintenance, vehicles, residue collection, computer support, concierge, and public relations.
- The Library and Documentation unit is the most relevant on the Campus, and one of the most prominent of the CSIC based on the importance of the collections and on the dynamics of exchange with other centres.
- Field research support Unit, which assists in the operations necessary for field experimentation.
- Analysis Service. This laboratory is operative since 1995, under the responsibility of the Department of Plant Nutrition. Its mission is the elemental and mineral analysis of plants.
- The Isotope Laboratory. The laboratory is located in an independent building equipped with all the requirements for radioactive isotope use. This facility is also used by personnel from other centres of the Campus.

1.6. EXTERNAL RELATIONS

Relationships with other academic organizations

University of Zaragoza (UZ)

Referred only to activities during 2004

- Participation of five scientists of EEAD in two research groups under the leadership or with the collaboration of the UZ. Both groups have obtained official recognition as such by the Government of Aragón (DGA).
- Participation of nine scientists of EEAD in four joint projects with the UZ (Faculties of Veterinary and Sciences, and *Centro Politécnico Superior*).
- For more than 10 years now, and under the UZ-CSIC agreement and other specific agreements with several Colleges, we are visited by approximately 30 Technical Agricultural Engineering students (*Ingeniería Técnica Agrícola*) per year, for summer training. We also train students from the Department of Biochemistry and Molecular and Cellular Biology of UZ.
- Participation in PhD courses.

Other Universities and Public Research Organizations

We collaborate with a number of Spanish universities and other public research Institutions with grants from the National Plan. In the last approved projects, funding for the participation of foreign groups was allowed. This has enabled us to incorporate groups from other European countries in projects led by EEAD.

Other educational agreements

- Foundation Empresa-University of Navarra, training agreement.
- University of Lleida, training agreement.
- University of Salamanca, training agreement.
- Public University of Navarra, agreement for the development of joint PhD study programmes.
- High-school Institute “Virgen del Pilar”, training agreement.

Bilateral relationships with foreign research Institutions

Bilateral Actions or Grants from competitive organisms (MEC, CSIC, AECI, etc) started during 2000-2004 include eight actions or projects with France (CNRS and INRA); two bilateral actions with the University of Bologna, Italy; one bilateral action with the University of Algarve, Portugal; one bilateral action with the Bulgarian Academy of Science; three bilateral actions or projects with the University Hassan II and University of Fez, Morocco; one bilateral action with Tunisia; two bilateral actions with CONICET, Argentina; and one bilateral action with the University of La Habana, Cuba.

This list of actions and projects reveals the endeavour of our Institute to consolidate relationships with European, Mediterranean and Latin-American countries.

In addition to these collaborations, there were numerous unofficial links with European and North American groups (especially USA, France, and Italy), which resulted in fifty-one SCI articles being published in 2000-04 between EEAD and international groups (31% of the EEAD SCI total).

Aula Dei Campus

- Participation of seven scientists of EEAD in two research groups under the leadership of CITA-DGA researchers. Both groups have obtained official recognition as such by the Government of Aragón (DGA).
- Frequent participation as lecturers in postgraduate courses at the IAMZ-CIHEAM.
- Participation of two scientists of EEAD in one research group under the leadership of IPE-CSIC researchers, also with official recognition as such by the Government of Aragón (DGA).

– The associated Laboratory of Agronomy and Environment was established in 1989 between EEAD and SIA (currently, CITA), and comprises part of the Departments of Soil and Water Resources (CITA) and Genetics and Plant Production (EEAD). Its current status should be updated.

Participation in collaborative networks

– COST Action 824, Gametic embryogenesis.
– COST Action 837, Plant biotechnology for the removal of organic pollutants and toxic metals from wastewaters and contaminated soils.
– COST Action 851, Gametic Cells and Molecular Breeding for Crop Improvement.
– COST Action 858, Viticulture – biotic and abiotic stresses – grapevine defence mechanisms and grape development.
– COST Action 859, Phytotechnologies to promote sustainable land use management and improving food safety; participation of seven scientists, and leadership of Working Group 3 (Improving nutritional quality and safety of crops).
– Iberoamerican Network on Microbial Biofertilizers in Agriculture (BIOFAG).
– Network on Abiotic Stress in Plants, funded by MCYT and MEC.
– Network on Efficient Use of Nitrogen in Agriculture, funded by MCYT and MEC.
– CSIC network on Land and Water Conservation.
– Network on Water Use Efficiency, financed by the Balearic Islands Government.
– European Interinstitute Committee for plant analysis.

Relationships with companies

Ties with private and public entities have progressively increased over the period 2000-2004. There was a total of 39 contracts or agreements with private and public companies, 19 of which were still active by the end of 2004. Of these, 16 were with private companies and 3 with public companies or Institutions. These 19 contracts and agreements represented a total input of 280,000 euros. The 39 contracts and agreements in the period 2000-2004 can be summarized as follows: six contracts with seed companies, for developing and testing of new plant materials; eleven contracts with horticultural companies, for the registration of new plant materials and technical support; eleven contracts with companies and users of the agrochemical sector, for field assessment of fertilizers and technical assistance; eight contracts with private and public companies for agronomical and environmental studies, and for licensing of EEAD software; and three agreements with public organisms for studies of biodiversity and variety identification.

2. INSTITUTE RESOURCES FOR 2000-2004

The data provided in this section refer to the Institute as a whole. Detailed information on the departments is provided in Annex 1.

2.1. HUMAN RESOURCES

There was a steady increase of graduate students and staff scientists numbers over the 2000-2004 period. We expect to maintain these positive trends over the next five-year period. An important number of graduate students came from North African and Latin American countries, many of them enrolled after attending graduate courses on Campus, at the IAMZ. Also, there was an increasing number of promotions achieved by staff scientists, which indicates the maturity of research groups. Many temporary contracts are not included in Table 2.1, as only contracts in force at December 30th each year were considered.

Table 2.1. Human resources

Table 2.1. Human resources (Institute)					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total scientific staff personnel	**24**	**27**	**31**	**31**	**31**
Nº Research Professors	1	2	3	4	4
Nº Scientific Investigators	5	4	5	3	3
Nº Staff Research Scientists	18	21	21	22	22
Nº University Professors (joint C/I only)	-	-	-	-	-
Nº Associate Professors (joint C/I only)	-	-	-	-	-
Nº Other Univ. Professors in other categories (joint C/I only)	-	-	-	-	-
Nº "Investigadores Titulares"	-	-	2	2	2
Nº "Doctores vinculados"	-	-	-	-	-
Total contracted postdoctoral personnel	**7**	**6**	**5**	**3**	**5**
Nº Ramón y Cajal contracts	-	1	1	2	4
Nº I3P doctors	-	-	1	-	-
Other contracted doctors/postdoctoral fellowship	7	5	3	1	1
Total predoctoral personnel	**9**	**11**	**18**	**18**	**19**
Nº predoctoral FPI and FPU fellowships	2	4	7	9	10
Nº predoctoral I3P fellowships	-	-	2	2	2
Other contracted predoctorals/predoctoral fellows	7	7	9	7	7
Total civil service research support personnel	**23**	**23**	**22**	**22**	**22**
"Titulados Superiores" (University graduates)	2	2	-	-	-
"Titulados de grado medio"	7	7	8	8	8
Laboratory assistants	12	12	12	12	13
Research auxiliaries	2	2	2	2	1
Total research support personnel (permanent)	**8**	**7**	**7**	**7**	**7**
Total contracted research support personnel	**5**	**9**	**9**	**7**	**12**
Total general services personnel	**22**	**24**	**24**	**23**	**24**
Total support unit personnel	**11**	**10**	**10**	**10**	**10**

2.2. SCIENTIFIC AND TECHNICAL INFRASTRUCTURE

Main scientific equipment purchased over the last 5 years is listed in Table 2.2. The acquisition of a majority of apparatus was supported with funds from the European Regional Development Fund (ERDF).

Table 2.2. Acquisition of equipment (more than 60,000 euros) in the last 5 years

Table 2.2. Acquisition of equipment (more than 60,000 euros) in the last 5 years (Institute)					
Equipment	**Year of purchase**	**Purchase cost (euros)**	**Annual maintenance cost**	**Date end of useful life**	**Observations**
DNA capillary sequencer	2001	83.540	2.300	2011	
Drip and sprinkler automated irrigation system	2001 - 2002	110.103	3.000	2026	
Greenhouse	2002	168.540	3.000	2012	
HPLC-MS-TOF	2002	283.677	10.000	2012	
Flow cytometer	2003	70.293	1.000	2010	
Microarray scanner	2003	62.242	3.000	2008	
RT-PCR	2003	54.900	2.500	2008	
Low background Germanium detector	2004	65.000	6.000	2022	

2.3. BUDGET

Variations in yearly incomes from external sources were due to fluctuations in the number of triennial projects granted each year, which is not constant. Investments were also variable, as they depended on highly variable biennial calls.

Table 2.3. Evolution of budgets (in euros)

Table 2.3. Evolution of budgets (euros) (Institute)					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total budget	4.101.910,64	4.306.404,54	5.047.444,57	5.007.272,32	4.931.302,03
Total external resources[1]	1.049.246,93	690.490,79	1.133.441,00	1.223.540,00	1.125.080,00
Total internal resources	3.052.663,71	3.615.913,75	3.914.003,57	3.783.732,32	3.806.222,03
Personnel budget[2]	2.626.303,97	2.790.939,18	2.937.092,20	2.999.872,04	3.159.262,74
Ordinary budget[3]	219.936,82	234.074,32	230.628,56	256.023,72	258.907,80
Investments[4]	206.422,92	590.900,26	746.282,81	527.836,56	388.051,49

[1] equivalent to *Ingresos comerciales*

[2] equivalent to *Capítulo 1*

[3] equivalent to *Capítulo 2*

[4] equivalent to *Capítulo 6*

3. INSTITUTE ACTIVITY BETWEEN 2000 AND 2004

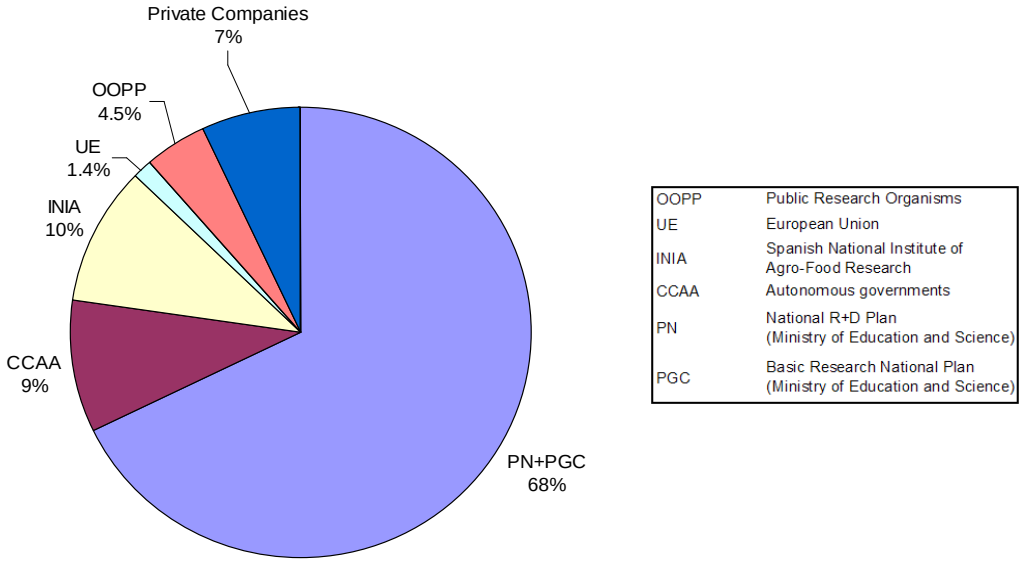
The data for the entire Institute are presented in this section. Information on Departments is given in Annex 1, and data on research groups is presented in Annex 2.

3.1. DIMENSION 1. FINANCIAL RESOURCES OF A COMPETITIVE NATURE (PUBLIC CALLS FOR GRANTS) FOR RESEARCH

Table 3.1. Competitive financing got in the 2000-2004 period.

Table 3.1. Competitive financing obtained (Institute)						
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000/4**
Nº National Plan projects	2	9	6	3	6	**26**
Nº PROFIT projects	-	-	-	-	-	**-**
Nº. FIS projects	-	-	-	-	-	**-**
Nº INIA projects	-	3	2	1	2	**8**
Nº projects/networks Framework R&D Programme	-	-	-	1	1	**2**
Nº regional government projects	3	4	4	2	9	**22**
Nº private foundation projects	-	-	-	-	-	**-**
Other competitive projects	-	1	1	2	1	**5**
Total Nº competitive projects	**5**	**17**	**13**	**9**	**19**	**63**
Nº of FTE involved in the approved projects	**7**	**28**	**42**	**21**	**57**	**154**
Financing (euros) National Plan projects	226.846	668.211	679.070	417.350	711.830	**2.703.307**
Financing (euros) PROFIT projects	-	-	-	-	-	**-**
Financing (euros) FIS projects	-	-	-	-	-	**-**
Financing (euros) INIA projects	-	139.202	69.848	141.386	72.172	**422.608**
Financing (euros) projects/networks Framework R&D Programme	-	-	-	20.000	39.400	**59.400**
Financing (euros) regional government projects	58.599	102.172	74.427	15.928	149.096	**400.222**
Financing (euros) private foundation projects	-	-	-	-	-	**-**
Financing (euros) other competitive projects	-	21.961	53.057	83.346	22.070	**180.434**
Total Financing (euros) competitive projects	**285.445**	**931.546**	**876.402**	**678.010**	**994.568**	**3.765.971**

Figure 3.1. External financing sources distribution over the 2000-2004 period (contracts with private companies and public sector included).



3.2. DIMENSION 2. SCIENTIFIC AND TECHNICAL PRODUCTION

3.2.1. Scientific production in ISI-indexed journals

Table 3.2.1. ISI-indexed scientific production.

Table 3.2.1. ISI-indexed scientific production (Institute)						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total Nº articles in SCI/SSCI/A&HIS-indexed journals	**39**	**36**	**24**	**32**	**31**	**162**
List of up to 20 ISI-indexed journals most relevant to the Centre/Institute's activity and articles in them (indicate the nº of articles published in each)	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Journal of Plant Nutrition (0,430)	4	4	2	1	2	13
Journal of Irrigation and Drainage Engineering (0,413)	3	1	1	2	4	11
Plant Physiology (5,634)	5	1	1	2	-	9
Agricultural Water Management (0,865)	2	-	1	1	3	7
Physiologia Plantarum (1,767)	2	1	2	-	2	7
Photosynthesis Research (2,239)	2	2	-	-	1	5
Functional Plant Biology (1,747)	1	1	3	-	-	5
Irrigation Science (0,996)	2	1	-	1	-	4
Molecular Plant-Microbe Interactions (3,580)	-	2	-	1	1	4
Plant and Soil (1,594)	-	-	2	-	2	4
Theoretical and Applied Genetics (2,287)	-	-	-	-	3	3
Journal of Physical Chemistry (3,679)	1	-	-	2	-	3
Euphytica (0,755)	1	-	1	-	-	2
Tree Physiology (2,087)	-	1	2	-	-	3
Quaternary International (1,422)	1	-	-	-	1	2
Planta (3,053)	-	1	-	-	1	2
Agronomy Journal (1,243)	1	1	-	-	-	2
American Journal of Botany (2,337)	-	-	-	1	1	2
Soil & Tillage Research (1,310)	-	-	-	1	-	1
Crop Science (0,828)	1	-	-	-	-	1
Otros	13	20	9	20	10	72

3.2.2. Scientific production in journals not indexed by ISI and in other publications

Research results of potential interest to the private sectors are routinely published in the main Spanish professional journals: *Agrícola Vergel, Anaporc, Fruticultura Profesional, Nutri-Fitos, Phytoma, Vida Rural, Surcos de Aragón, ITEA, Geo-temas, Riegos y Drenajes*, etc. By means of these journals, the Centre communicates its results, and maintains an active presence in the productive sector.

Table 3.2.2. Non-ISI scientific production.

Table 3.2.2. Non-ISI scientific production (Institute)						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº articles in international NON-ISI journals	6	2	4	4	12	**28**
Nº articles in national NON-ISI journals	13	14	19	21	17	**84**
Nº chapters in books/Collective works*	1	3	7	4	4	**19**
Nº collective works edited/directed*	-	-	-	-	-	**-**
Nº books	-	-	1	-	-	**1**

**** Collective works do not include meeting proceedings***

3.2.3. Reports and invited conferences presented at congresses and participation as editors or advisors to scientific publications

Table 3.2.3. Congresses and editorial activity.

Table 3.2.3. Congresses and editorial activity (Institute)						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total presentations at national congresses	**14**	**25**	**26**	**34**	**26**	**125**
Invited presentations at national congresses	3	1	3	3	5	**15**
Organizers/Members of scientific committees for national congresses	-	2	2	1	2	**7**
Total presentations at international congresses	**31**	**40**	**53**	**25**	**38**	**187**
Invited presentations at international congresses	3	3	3	7	11	**27**
Organizers/Members of scientific committees for international congresses	2	-	7	5	2	**16**
Editors/Directors of ISI journals	-	-	-	-	-	**-**
Editors/Directors of international non-ISI journals	-	-	-	-	-	**-**
Editors/Directors of national non-ISI journals	1	1	1	3	3	**9**
Board members of ISI journals	-	-	-	-	-	**-**
Board members of international non-ISI journals	1	1	2	2	2	**8**
Board members of national non-ISI journals	2	2	3	2	2	**11**

3.2.4. Application for and granting of patents and utility models

Most of EEAD registered inventions are plant varieties. The portfolio of active patents includes four fruit-tree rootstocks (three already licensed), three barley cultivars (one licensed), two methods for the diagnosis of, or selection for tolerance to nutritional deficiencies in fruit-trees, and a software programme for the comprehensive management of water in irrigation districts.

Table 3.2.4. Patents.

Table 3.2.4. Patents (Institute)						
Years	2000	2001	2002	2003	2004	Total 2000-4
NATIONAL patents applied for	5	1	-	1	-	**7**
NATIONAL patents obtained	3	-	1	2	2	**8**
EPO patents applied for	-	-	-	-	-	**-**
EPO patents obtained	-	-	3	-	-	**3**
PCT patents applied for	-	-	-	-	-	**-**
PCT patents obtained	-	-	-	-	-	**-**
USPTO patents applied for	-	-	-	-	-	**-**
USPTO patents obtained	-	-	-	-	-	**-**
Portfolio active national patents	5	5	6	8	9	**9**
Portfolio active patents EPO, USPTO, etc.	-	-	3	3	3	**3**

3.2.5. Technology transfer and participation of Centre or Institute personnel in the generation of or in activities of companies, especially of basic technology

Table 3.2.5. Technology transfer.

Table 3.2.5. Technology transfer (Institute)						
Years	2000	2001	2002	2003	2004	Total 2000-4
Patents licensed to companies	-	2	2	4	4	**4**
Patentes in exploitation	3	5	5	5	5	**5**
Revenues of licensed/exploited patents	-	-	3.606,07	4.223,72	4.252,28	**12.082,07**
Start-ups initiated by Centre/Institute personnel	-	-	-	-	-	**-**
Nº persons del C/I related to Start-ups	-	-	-	-	-	**-**

3.3. DIMENSION 3. INTERACTION WITH THE PRODUCTIVE AND SOCIAL ENVIRONMENT AND INTERNATIONALIZATION

3.3.1. Contracts with companies for joint implementation of research projects, advisory services, technical reports, etc.

Table 3.3.1. Contracts and services to companies.

Table 3.3.1. Contracts and services to companies (Institute)						
Years	2000	2001	2002	2003	2004	Total 2000-4
Nº R&D contracts/agreements	10	1	3	5	4	**23**
Revenues from R&D contracts	93.211,91	3.948,13	67.011,88	53.683,52	75.647,52	**293.502,96**
Nº de technological or advisory services	-	1	-	-	-	**1**
Revenues from service or advisory contracts	-	1.358,29	-	-	-	**1.358,29**

3.3.2. Contracts and agreements with the public sector (ministries or their organizations, regional governments, etc.) and not-for-profit institutions

Table 3.3.2. Contracts and agreements with the public sector.

Table 3.3.2. Contracts and agreements with the public sector (Institute)						
Years	2000	2001	2002	2003	2004	Total 2000-4
Nº R&D contracts/agreements	3	3	2	4	3	**15**
Revenues from R&D contracts	28.561,29	24.701,59	28.243,96	80.516,44	29.949,90	**191.973,18**
Nº advisory services	-	-	-	-	-	**-**
Revenues from advisory contracts/agreements	-	-	-	-	-	**-**
Associated R&D units	-	-	-	-	-	**-**

3.3.3. Implication of the Centre or Institute's researchers in external scientific and technological consultancies

Table 3.3.3. Assessment.

Table 3.3.3 Assessment (Institute)						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº ANEP coordinators/assistant	-	-	-	-	-	**-**
Nº managers/assistant PN	-	-	-	-	-	**-**
Nº National Plan selection commission members	-	1	2	4	-	**7**
Nº regional government selection commission members	-	1	1	-	-	**2**
Nº evaluations as HLG en EU	-	-	-	-	-	**-**
Other expert advisory committees	-	-	1	1	4	**6**

3.3.4. Internationalization of research activities

Table 3.3.4. Internationalization.

Table 3.3.4. Internationalization (Institute)						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº projects/networks Framework R&D Programme	-	-	-	1	1	**2**
Nº projects in other European or international programs	1	1	1	1	2	**6**
Non-Spanish staff research personnel	-	-	-	-	-	**-**
Postdoctoral personnel contracted with non-Spanish funds	-	-	-	-	-	**-**
Foreign researchers on sabbatical and visiting professors (minimum 6 months)	1	2	1	-	-	**4**
Integrated actions and other bi(multi)lateral collaborations	3	-	-	6	7	**16**

3.4. DIMENSION 4. TRAINING OF RESEARCHERS AND POSTDOCTORAL ACTIVITY

Table 3.4. Formative activity.

Table 3.4. Formative activity (Centre / Institute)						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total predoctoral fellowships/contracts granted	**2**	**2**	**11**	**4**	**3**	**22**
Predoctoral FPI fellowships granted	1	2	3	4	2	**12**
Predoctoral FPU fellowships granted	-	-	-	-	-	**-**
Predoctoral Regional Government fellowships/contracts granted *	-	-	1	-	1	**2**
Predoctoral I3P fellowships	-	-	2	-	-	**2**
Postgraduate I3P fellowships	-	-	2	-	-	**2**
Other predoctoral fellowships/contracts granted*	1	-	3	-	-	**4**
Total stock predoctoral fellowships/contracts	**8**	**10**	**21**	**18**	**17**	**27**
Total predoctoral project fellowships/contracts granted (in equivalent/year)	1	1	0	1	2	**5**
Total postdoctoral fellowships/contracts	**4**	**4**	**2**	**1**	**2**	**13**
Total Ramon y Cajal contracts granted	-	1	1	1	2	**5**
Total Juan de la Cierva contracts	-	-	-	-	-	**-**
Post-doctoral contracts granted by regional government*	-	2	-	-	-	**2**
Total Postdoctoral I3P doctor granted	-	-	1	-	-	**1**
Other postdoctoral fellowships/contracts granted*	4	1	-	-	-	**5**
Total stock postdoctoral contracts	**8**	**8**	**5**	**4**	**4**	**17**
Total postdoctoral project fellowships/contracts granted (in equivalent/year)	-	-	1	0	1	**2**
Total technical I3P contracts granted	-	4	2	-	3	**9**
Total MEC contracts for technical personnel	-	-	-	-	-	**-**
Other contracts for technical personnel	-	-	-	-	-	**-**
Total doctoral theses directed by C/I personnel	3	2	1	7	2	**15**
Total theses under way directed by C/I personnel	12	14	23	22	22	**34**
Total doctoral courses directed by C/I personnel	3,0	-	2,0	3,0	3,0	**11,0**
Total credits for doctoral courses	3,0	0,2	0,4	3,1	4,2	**10,9**
Total credits for postgraduate courses	3,4	5,9	4,5	5,2	1,8	**20,8**
Nº university associate professors	-	1,0	1,0	1,0	1,0	**4,0**

**** In competitive calls for grants***

3.5. DIMENSION 5. ACTIVITIES FOR DEVELOPMENT OF SCIENTIFIC CULTURE OR DISSEMINATION

3.5.1. Participation in the Week for Science, science fairs, or other activities to develop scientific culture

There was an active and increasing participation of the EEAD during the past five-year period 2000-2004 in the celebration of the "Week for Science" held in 2001, 2003 and 2004. The last two years, EEAD has also participated in the acts of the programme "Discover the CSIC in Aragón", promoted by the Regional Delegation of the CSIC, including a travelling exhibition, and lectures all around our region, with large involvement of the EEAD's staff.

As part of the CSIC's contribution, the EEAD participates regularly in fairs, particularly in the specialized fair SAMATEC (leading national fair on Agriculture, Environment and Technology).

3.5.2. Dissemination activities in the media (press articles, etc.)

Frequent collaborations in the weekly science supplements of the two major newspapers of Aragón (El Periódico de Aragón, I+Dear, and Heraldo de Aragón, Third Millenium), up to six in 2004. Contributions are also asked from the most widespread journals of the agricultural sector, where numerous papers concerning the research carried out at Aula Dei and its results are published.

3.5.3. Training of primary and secondary school teachers

There are almost no institutional iniciatives addressing these type of activities.They should be clearly encouraged by our authorities.

3.5.4. Preparation of manuals and textbooks

EEAD participates in the elaboration of textbooks for Universities and in the elaboration of handbooks for students attending courses of the CSIC's training programme which are instructed by the Institute's staff.

3.5.5. Open-house days at the Centre/Institute

On top of the "open-house" days which are celebrated concurrently with the yearly Week of Science (receiving over a hundred students from high schools or universities every year), the Institute holds a policy of receiving the visit of a high school or university classroom every month.

3.5.6. Vocational days in secondary schools

This activity takes place during the monthly visits of (mostly) high school, and university students to our facilities, when talks are given by the scientific staff of our Institute.

3.5.7. Others

EEAD scientific staff gave about 25 lectures and seminars in technical workshops organized by professional associations, to audiences of producers and companies.

4. STRATEGIC PLAN FOR THE INSTITUTE

4.1. ANALYSIS OF THE STATE OF THE ART AND POSITIONING OF THE INSTITUTE IN ITS COMPETITIVE ENVIRONMENT

4.1.1. Strengths	4.1.2. Weaknesses
1. Well-trained human resources. 2. Multidisciplinary research groups, with good capacity of interaction among them. 3. Research groups of national and international relevance, leading National and International Research Programs. 4. Demonstrated capability to obtain funding at national and local levels. 5. Synergism between the diverse Aula Dei Campus Institutes, which carry out postgraduate training, development in cooperation, and research activities in the fields of Agriculture, Animal Sciences, Food Technology, Environment and Natural Resources. 6. Excellent facilities for agricultural sciences research, including good infrastructures for agronomic evaluation. 7. Wealth and specificity of the Spanish genetic diversity kept at the Institute, along with a good knowledge of plant materials and experience in developing and registering commercial varieties. 8. Demonstrated capacity to develop successful technologies to increase water use-efficiency in agriculture. 9. Leading-edge laboratory technologies available.	1. Lack of internal structures to facilitate the approach and cooperation with companies of the sector. 2. Scientific productivity can be improved. 3. Limited social impact of the Institute research activities at the public level. 4. Low influence of the CSIC in the management of the R+D research funding scheme of the Regional Government. 5. Limited current participation in research programs financed at the European level. 6. Research groups of relatively small size.
4.1.3. Opportunities	**4.1.4. Threats**
1. The ability to respond and accommodate to urgent social and legal demands in the areas of sustainability, traceability and quality control within the agro-food sector. 2. The capability for cooperation in development, especially with the Magreb and Latin American areas, taking advantage of the relationship with the IAMZ-CIHEAM. 3. The rapid turnover in the Life Sciences area. The consolidation of an "-omics" technology platform will enable us to increase the efficiency of the current lines of research and promote the creation of new ones. 4. The social pressure to increase water use-efficiency. 5. The interest of the international scientific community concerning the great diversity and differentiation of autochthonous Spanish plant material. 6. The incorporation of the objectives of the Institute in the new R+D Program of the Aragon Autonomous Community, and the interest expressed by the Aragon Government in the creation of a Scientific/Technological Park on the Aula Dei Campus. 7. The increasing social interest and awareness regarding scientific matters.	1. The greatest threat is the current trend for a decreasing interest on agricultural research in developed countries. 2. The uncertain future of the large extensive crop areas, due to the uncoupled payments as considered in the EAP. 3. The increasing bureaucratization of the scientific activity, which decreases the scientific efficiency of experienced human resources. 4. The low dynamism of the local economic sector. 5. A risk of losing competitiveness if the renewal of human resources is not coupled with the rate of development of Life Sciences research. 6. The ongoing decrease in the support and technical personnel to scientist ratio.

4.1.5. Integrated analysis

Research capacities. The EEAD has a sufficient human resource critical mass to carry out quality research and development activities, although new incorporations to some specialized areas will be needed to increase the EEAD potential. The numerous active collaborations with relevant International groups also complement the EEAD capacity and increase its potential.

Relative quality. A large number of the EEAD research groups are well known in Spain and have a significant International projection. The quality of the scientific production and transference of products and technologies make it a centre of obligatory reference in Agricultural research within Spain.

Competitive trend. The trend is clearly ascending. On the one hand, the EEAD has tripled the number of scientists over the last 20 years (11 in 1985, 32 in 2005), increasing even more the number of personnel in training and scientific productivity (6 SCI articles per year in 1985-1989, and more than 30 SCI articles per year in 2000-2004). These data support the EEAD's competitiveness given the system of access to permanent positions in the CSIC, which primarily regards the scientific quality of the applicants. On the other hand, many of the existing groups are reaching a maturation and consolidation phase, both with respect to the number of components and the coordination of National and International research groups. It is also remarkable the participation of 100% of the Institute researchers in research groups recognized as such by the Aragon Government after external peer review. This positive competitive position must be kept and reinforced by the incorporation of new personnel, providing new expertise, in all three research areas, to accomodate to changes in science trends and society demands.

Table 4.1. Competitive position of the Institute in the lines of research.

Line of research	Overall evaluation	Capacity	Quality	Competitive tendency	Relevant Observations	Proposed action
Phytogenetic resources and plant breeding	4	4	4	4	4	To be enhanced
Knowledge and optimization of fundamental plant processes	4	4	4	4	4	To be enhanced
Development of environment friendly agricultural systems	4	4	4	4	4	To be enhanced

Relevance of CSIC. The EEAD is an Institute of reference for agriculture in temperate semi-arid climates, which occur mainly in Mediterranean-type areas. The multidisciplinary nature of the EEAD departments should be further stressed, with groups tackling basic research at a biochemical and molecular level (including the use of ¨-omic¨ technologies), the conservation and directed use of phytogenetic resources, the development of new varieties, and studies on sustainable agronomy. These capabilities, along with the numerous projects of collaboration with other Spanish and international groups result in the Institute and the CSIC having a leading position in these areas in Spain.

With respect to National and International competitors, agricultural research in Spain is not very dense, so that competence for resources cannot be considered as a limiting factor, as long as the promised increase in R+D+i funds by the National and Regional Governments is sustained. At European level, however, there is a strong competitiveness in the agricultural sciences area for the decreasing available resources in the FP6 and FP7 framework, thus making integration in the ERA difficult. The activity of the EEAD is complemented by other institutes within the CSIC Agricultural Sciences Area given the existing collaboration between centres. Regarding other Spanish bodies, the autonomic research centres originated from the INIA (National Institute for Agricultural Research) constitute the main force for agricultural research in Spain. Aragon's CITA is also on the Aula Dei Campus, and is more of a partner than a competitor since many opportunities for joint cooperation arise. Other relevant players in agro-food research in the EEAD neighbouring environment are the University of Zaragoza, specially the Colleges of Veterinary Science (with studies in Food Science and Technology) and Sciences (with studies in Chemistry and Biochemistry) in Zaragoza, and the Agricultural Engineering Schools in Huesca and La Almunia. The Aragón Institute of Technology also offers services to agro-food sector companies. Collaboration with the IRTA and the School of Agricultural Engineering of Lleida, also located in the agricultural region of the Ebro River Valley, is also very important.

Performance proposal. We propose the enhancement of the three lines of research described in Tables 1.4 and 4.1. All three lines count on considerable human and material resources, relevant results have been and are being obtained and, taken together, they adequately cover all aspects of a high quality agro-food research initiative.

It is considered of great interest to support the creation of integrative lines of research, combining the activities of the EEAD research groups, as a vehicle to canalise synergies and complementariness. These lines must focus on obtaining responses to socio-economic demands, and should address existing problems. An example of a horizontal, multidisciplinary study would be the attempt to tackle agronomy, nutrition and biology of irrigated olive-tree plantations of intensive production. These plantations constitute a new production system for this crop, of strategic importance in the Mediterranean area, which has not been previously investigated.

4.2. MISSION AND VISION OF THE INSTITUTE

4.2.1. Mission

The EEAD-CSIC is an Institute of the Spanish Council for Scientific Research, ascribed to the Agricultural Sciences area. Its ultimate mission is to provide the agricultural sector with appropriate materials and technologies, to increase competitiveness and sustainability, through a deeper knowledge of basic processes of the plant-environment system. This mission leads to the production of results for the Agro-Food, Biotechnology, and Environment sectors, as we endeavour to: increase crop productivity in temperate, semi-arid zones; develop technologies for the sustainability of agricultural production, preserving the environment; and increase the quality and added value of agricultural products. This mission encompasses activities in high quality research, postgraduate education and technical training, technical consulting for public and private sectors, and dissemination of our results to the society.

4.2.2. Vision

The EEAD-CSIC should consolidate its role as one of the reference Agricultural Research Institutes in Spain focused on temperate, semiarid environments. It must keep its commitment to develop high quality research, increasing its international relevance, and participating more actively in European Agro-Food research platforms. To remain competitive, it must integrate at good pace high throughput cutting-edge technologies. It will have an increasing impact regarding number and quality of scientific publications, and high-level training and education; a growing influence in the creation of wealth, and will contribute to raise social awareness on the importance of scientific culture. The immediate research objectives should especially focus on areas of great social demand, such as the sustainability of agricultural systems, the management of water as a limited and strategic resource, and the quality and security of agricultural and agro-food products. The integration of efforts and objectives with those of other Institutes in the Aula Dei Campus will consolidate it as an obligatory reference within the Spanish and Mediterranean agro-food and environmental research sector.

4.3. RESEARCH STRATEGY

The strategies that the EEAD will follow to reach the objectives shall focus on:

- Developing internationally relevant and competitive quality research.
- Offering innovative solutions to socio-economic demands.
- Using available germplasm and genomic techniques for plant breeding, to produce high quality products in a sustainable manner.
- Training of graduates and technicians in R+D+i.

The lines of action that will be used to implement such strategies will be:

In developed countries, the interest of the agricultural sector has switched from concentrating on the grower and on plant productivity, to focusing on sustainable systems, consumer interests and agricultural product quality (Op. 1). The EEAD must comply with changes in social demands, taking advantage of the synergies between research groups (St. 2), combining available classical and leading-edge technologies (St. 6 and 9), and exploiting the huge pool of native genetic diversity available (St. 7). **In this context, the EEAD shall promote integrative, multidisciplinary projects, to be funded by the Autonomous Community, the National Research Program, the European Framework programs FP6 and FP7, and any other call for proposals launched by National or International funding agencies.**

The extensive phenotyping capacity (St. 6), along with the diversity and specificity of available plant germplasm (St. 7), place the EEAD in an excellent starting position to develop studies for genetic mining, functional genomics, proteomics and metabolomics, in relation to natural and induced diversity. **The EEAD will promote integrative proposals in this regard, with the aim of increasing its involvement in future programmes of international scope (We. 5).**

The rapidity of advances in Life Science disciplines demands the continuous updating of scientific instrumentation, techniques, and expertise to maintain and increase competitiveness. The acquisition of instruments to implement "-omic" technologies occurs in parallel with a change in the research strategies towards more ambitious goals, implementing more global approaches to facilitate a holistic interpretation of biological processes. The strengths of the EEAD, which include adequate human resources and experience in leading-edge technologies (St. 1 and 9), assure a good position to take advantage of the new technological developments in this area (Op. 3). New equipment is needed to keep a competitive edge, and new expertise in bioinformatics must be incorporated to fully exploit this developments

Water constitutes one of the most scarce and appreciated resources in Mediterranean countries. Water availability is a crucial limiting factor for the development of these regions, and the Spanish society is fully aware of this fact. The EEAD has already produced a relevant response (St. 8) to the strong social pressure to increase water use efficiency (Op. 4). **The EEAD will continue to develop initiatives promoting a better water management through the transfer of knowledge and technologies to the agricultural sector and the society.**

The soil is essentially a non-renewable, limited resource, with a central role in agricultural systems. Adequate management and evaluation procedures must be part of the integral strategy for the conservation and improvement of agricultural systems. The sustainability of agricultural production is a major demand of the society (Op. 1), included in successive European Research Frameworks. **The EEAD's leading capacity, demonstrated in National and European Programmes, will be used to participate in new International initiatives (We. 1), as well as to collaborate with transfer and dissemination of knowledge to Spanish producers.**

Social and economic impact of the EEAD, as well as its significance and repercussion in the Aragon Autonomous Community (We. 1, 3 and 4) will increase markedly if the recent initiative to build a Scientific-Technological Park in the Aula Dei Campus is successful (Op. 6). **The EEAD will support initiatives leading to the creation and development of the Park, in collaboration with other organisations of the Campus (St. 5).**

The EEAD success in developing and registering commercial cultivars (St. 7) has resulted in marketable products, which increase the social relevance of our activities in the productive sector (We. 1, We. 3). **The EEAD assumes the compromise to continue producing high quality plant materials in response to demands from the seed and commercial nursery sectors,** enhancing connections to companies through the formalization of contracts and agreements, and also

via the existing specific calls for proposals directed to technology transfer. The capacity to interact with companies would be further increased and promoted if the Aula Dei Campus Scientific-Technological Park initiative is to be finally launched.

The spread and communication of results through peer-reviewed publications will continue as one of the main goals of EEAD activity. **An increase of the quality of the scientific outlets will be sought to enhance the impact of our research (We. 2).**

The social impact of our research activities (We. 3) must be improved, via a better diffusion of our research results through the media, and taking advantage of the increasing social interest in scientific issues (Op. 7). The social influence can be greatly improved by presenting the "**Campus de Aula Dei**" as a trademark image for quality agricultural research. **In this context, the EEAD will promote the adoption of this trademark by all the members on the Campus, so that it can be used in any activity that can possibly result in improving significantly social awareness.**

The leadership capacity of the EEAD in relevant National and International Research Programmes (St. 3), the possibilities for co-operation development through the Campus Institute IAMZ, specially with the Magreb and Latin America (Op. 2), and the marked interest of the international scientific community for the large diversity and differentiation of autochthonous Spanish germplasm (Op. 5) **will favour the participation of the EEAD in Co-operation Development Programmes funded by the European Union (We. 5).**

The international collaborations and recognition of the EEAD must be enhanced (We. 5). **Participation of EEAD researchers in European projects will be encouraged, seeking for the best instruments available in ERA, FP6, and FP7.**

Aware of the limited size of the research groups (We. 6), **the EEAD will promote the creation of critical masses, in collaboration with other groups of the CSIC and other Spanish Institutions.**

The EEAD will promote cooperation between research groups through the development of horizontal initiatives or focussed projects, combining complementary abilities, and enabling integral approaches to relevant local problems. The elaboration of this type of initiatives, to be sponsored by different funding agencies, will be strongly encouraged at this Institute.

The EEAD will encourage the incorporation of high quality scientists, whose background and expertise supplement the Institute's research lines, to complement and broaden EEAD's scientific capacities.

The EEAD will promote high quality education concerning MSc and PhD studies in Agricultural Sciences, and will try to maintain and increase the number of graduate students and postdocs positions working at the Institute.

Crop productivity aspects cannot be disregarded, because they are still very relevant in a worldwide context. Progressing in the knowledge of the molecular basis of plant productivity is the only way to facilitate qualitative changes in crop production at a global scale. There is little doubt that transgenic technologies will be crucial to drive advances in the knowledge of basic processes towards breeding programs aimed at obtaining products useful for the society. The EEAD is prepared to act in all the stages of the process, since it has human resources, leading-edge technologies and a developed breeding platform, all of them ready to be used should transgenic technologies be accepted by the EU society, in line with the CSIC *Position Paper* on the 7th EU Research Framework Program. **The EEAD will continue promoting quality basic research driven to understand basic processes in model and crop plant species, using genomic, proteomic, metabolomic, and transgenic technologies. It will also promote social dissemination of scientific knowledge on molecular technologies.**

4.3.1. General objectives

4.3.2. Specific objectives

I. PHYTOGENETIC RESOURCES AND PLANT BREEDING

The present situation and future perspectives of agriculture in our zone require plant materials with a) good adaptability and high level of tolerance to abiotic stresses; b) resistance or tolerance to biotic stresses and high efficiency in response to fertilizers, thus reducing the amount of inputs needed; and c) potential to result in high quality products for the future market. To meet these goals, our approach integrates new advances in different areas of knowledge and biodiversity management, the identification of key traits affecting plant productivity and the analysis of their genetic control, and the generation of new variability, combining all of them through plant breeding as a common platform for the development of germplasm, cultivars and improved rootstocks. This main objective is organized into the following **specific objectives**:

I.a. Maintaining and exploiting natural genetic variability (biodiversity).

Nowadays, it is critical to reduce the process of genetic erosion, and to take advantage of important traits present in natural variation. The geographical and historical richness of the Iberian Peninsula has resulted in a remarkably abundant biodiversity that can now be accessed by researchers in an increasingly precise fashion through the use of molecular techniques.

I.b. Generating new variability, identifying and selecting traits of interest.

A key element in the process of selection and development of new materials is the target-oriented generation of variability and its recombination by different techniques. QTL identification enables the dissection of complex traits, facilitating their tracking in plant breeding. Classical breeding methodologies have taken advantage of new tools involving molecular markers, in the design of crosses, and throughout the breeding program; or allowing the use of gametic or somatic embryogenesis to shorten the time needed to fix a genotype in grasses. Similarly, implementation of *in vitro* selection, or the use of biochemical markers, will increase the efficiency of the identification and selection processes in fruit trees.

A deeper knowledge of the mechanisms studied in objective II will generate new selection tools. But also, the great genetic diversity of our crops constitutes a clear substrate to test hypotheses such as those expressed in main objective II.

I.c. Development of new plant materials.

This activity arises as a natural consequence of the two previous points. One goal is to develop plant breding in crops without private sector investment in R+D, as a consequence of the low profits involved. In other crops, the aim is to develop improved germplasm stocks to be transferred to seed companies. In the case of fruit trees, the Spanish growers demand well adapted cultivars and rootstocks that can reduce the existing vulnerability due to the dependence on foreign suppliers.

II. IMPROVING THE KNOWLEDGE OF PLANT YIELD-LIMITING FUNDAMENTAL PROCESSES TO OPTIMIZE OUR AGRICULTURAL SYSTEMS

Future production systems for agricultural products must be based on the knowledge and optimization of plant fundamental processes. Systems can be developed to increase the quality of agricultural products (more nutritious and healthier food), to decrease the incidence of abiotic stress factors in crops, and to minimize the environmental impact of agricultural fertilization practices. A multidisciplinary approach, using physiological, biochemical, molecular biology and new "-omic" technologies (ionomics, genomics, proteomics, xenomics and metabolomics) will be followed in these studies. The **specific objectives** are:

II.a. Fundamental processes in plants: photosynthesis and nitrogen fixation.

To reach the final objective of increasing the quality and yield of agricultural products while decreasing nutrient inputs, it is necessary to improve the state of knowledge of basic carbon assimilation, symbiotic nitrogen fixation and nutrient acquisition processes.

II.b. Physiology of plants under abiotic stresses.

The characterization of stress tolerance mechanisms will facilitate the establishment of a basis to improve the resistance of crops grown under adverse environmental conditions (e.g. nutrient deficiencies, drought, salinity, excess of light, extreme temperatures, heavy metal toxicity), and to cope with challenges posed by global environment changes.

II.c. Optimization of plant nutrition in a sustainable agriculture context.

To develop sustainable systems it is necessary to minimize fertilizer inputs, exploiting natural processes as well as renewable resources. Metals are especially important in this context, because metal deficiencies decrease quality and yields of many agricultural products. Also, metal deficiencies cause widespread nutritional problems affecting a high percentage of the population in many areas of the world. Metals are also associated with soil pollution in some areas. The knowledge of the mechanisms of metal acquisition, translocation and storage is essential for the discovery of solutions to these problems.

II.d. Reproductive biology.

Given the importance of the reproductive phase in fruit-crops production, research in this area will improve the understanding of the causes leading to erratic fruit setting, and the adoption of environment friendly agricultural practices to ensure fruit production.

III. DEVELOPMENT OF ENVIRONMENT FRIENDLY AGRICULTURAL PRODUCTION SYSTEMS

This objective is tackled in two complementary ways. On one hand, a disciplinary approach is applied to the aspects related to soil and water from a sustainable management viewpoint. On the other hand, a multidisciplinary approach is applied to crops of the greatest interest in our geographical zone for the development of technologies, adapted to our agroclimatic conditions and according to environmental friendly practices leading to optimal and sustainable agricultural productivity. The **specific objectives** are:

III.a. Optimization of soil use, characterization, degradation and conservation.

The middle Ebro River Valley is one of the areas more prone to desertification in Europe, due to the prevailing soil, climatic and vegetation characteristics. In this physiographic context, any anthropic impact can trigger important environmental problems directly affecting the soil as a non-renewable resource. Therefore, the improvement of agronomical practices to obtain effective soil protection against several degradation processes is an issue of major economic and environmental interest.

III.b. Optimization of water use in irrigated agriculture.

The management of water resources in irrigated agriculture presents serious deficiencies in Spain, particularly in the Ebro River Valley. In this context, our aim is to develop the technological support necessary to avoid these deficiencies and to optimise the use of such scarce and strategic resource. We aim to develop and transfer technologies to improve the economic and environmental competitiveness of farmers.

Table 4.3.2. General and specific objectives (six following pages)...

ACTIONS	TASKS	RESPONSIBLE	CONDITIONS	TERM	OBSERVATIONS
General Objective I	**Phytogenetic resources and plant breeding**				
Specific Objective I.a	Maintaining and exploiting natural genetic variability (biodiversity)				
Characterization, conservation and management of the Spanish genetic diversity of cereal landraces. Prospection of genes and traits in core collections	Dissemination of information on the Spanish barley core collection: web page and monograph	J.M. Lasa E. Igartua		Monograph and web page, 2007	SCI and dissemination articles
	Relating phenotypic and molecular diversity in the Spanish barley core collection by means of association mapping				
	Characterization of the Spanish maize core collection for biotic (corn borers) and abiotic (drought) stresses	A. Álvarez	Collaboration with Misión Biológica de Pontevedra (CSIC), and NEIKER from Basque Country	Monograph in 2007	SCI articles
	Introgression of outstanding Spanish landraces in the breeding program, according to information of molecular markers	M.P. Gracia A.M. Casas	Continuation of the barley breeding program	Continuous	Assesment by measuring the contribution of local germplasm to the breeding program.
Recovery and maintenance of fruit-tree cultivars and rootstocks. Phenotypic and genotypic characterization	Germplasm collection and cultivar characterization in cherry, apricot, and plum trees, and *Prunus* rootstocks	A. Arbeloa M. Herrero P. Andreu J.A. Marín	Collaboration with CITA-DGA	Germplasm recovery 2008; cherry-tree core collection, 2009	Dissemination and SCI articles
	Conservation and characterization of peach tree and *Prunus* rootstock genetic resources. Collection and inclusion of local materials in the EEAD collections	M.A. Moreno Y. Gogorcena		Continuous	Utilization as a reference in the MAPA variety registration process. SCI articles
	Molecular characterization and cataloguing of grapevine genetic resources (including materials collected from marginal crop areas), and *Prunus*	Y. Gogorcena M.A. Moreno	Maintenance of Movera grapevine collection (DGA)	2009	SCI articles, web page and cultivar catalogue
	Characterization, documentation, and establishment of the Spanish apple-tree core collection	A. Blanco	Jointly with Univ. Pública de Navarra and Univ. de Lleida	2009	SCI and dissemination articles
Specific Objective I.b	Generating new variability; identification and selection of traits of interest				
Selection systems for agronomic traits	Application of early selection for iron chlorosis, salinity and root asphyxia tolerance in fruit-tree species	J. A. Marín A. Arbeloa P. Andreu		Technology transference to commercial nurseries, 2007	Technology transference contracts with the private sector. SCI articles
	Characterization of the processes involved in fruit organogenesis, for further application in micropropagation and *in vitro* selection				
	Histochemical study of the adaptative response to environmental conditions				
	Development and application of biochemical techniques for selection of iron chlorosis-tolerant plant materials in hydroponic culture	Y. Gogorcena M.A. Moreno	Limited growth chamber space	2009	SCI articles

ACTIONS	TASKS	RESPONSIBLE	CONDITIONS	TERM	OBSERVATIONS
QTL and functional marker identification	Genetic analysis of barley gametic embryogenesis: identification of QTLs for embryogenesis and albinism, and validation in materials of agronomic interest	M.P. Vallés A.M. Castillo		2009	SCI articles
	Identification of candidate genes associated to the stress pre-treatment phase (of the *in vitro* culture technique) by means of barley microarrays				
	Development of effective marker systems for the identification and selective transmission of barley traits. Identification of highly efficient markers bearing functional information for adaptation	A.M. Casas E. Igartua	Collaborations with Oregon State University, Agricultural Research Institute (Hungary), Institute of Epidemiology and Resistance (Germany)	2009	Elaboration of a functional characterization system for plant adaptation in 2008; SCI articles
	Identification of QTLs for barley agronomic traits				
	Genetic analysis of iron cholorosis tolerance in *Prunus* and grapevine; search for QTLs in segregating populations, and search for candidate genes by means of cDNA-AFLP (differential expression of genes under iron chlorosis conditions)	Y. Gogorcena M.A. Moreno		2009	SCI articles
Generation of variability: transformation and mutation	Development and molecular analysis of advanced generations of barley transgenic lines containing genes for fructan synthesis	L. Cistué M.P. Vallés A.M. Castillo		2009	SCI articles
	Validation of a model of mutant induction through the application of sodium azide to microspores, and further *in vitro* selection for boron tolerance				
Specific Objective I.c	Development of new plant materials				
Development of barley varieties adapted to the Spanish environmental conditions	Development of new barley varieties by means of a multi-location pedigree breeding program, with four primary centers of selection and ten evaluation environments for agronomic traits	M.P. Gracia A.M. Casas E. Igartua J.M. Lasa	Continuation of the breeding program, currently co-ordinated with ITA from Castilla-León, IRTA from Cataluña and ITAP from Castilla La Mancha	Three cultivars, in 2006, 2008 and 2009	Evaluation through the number of varieties incorporated in the commercial list
	Crossing design in the breeding program using parental characterization (genetic distance, diversity) and retrospective analysis of their combining ability				
	Introgression of specific adaptation traits, plant height and disease resistance by marker assisted backcrossing				
Development of advanced materials in maize	Maize population breeding for maturity groups 600-700, by means of reciprocal recurrent selection in the "Spanish" against "dent" heterotic pattern	A. Álvarez		Four year cycles	Development of advanced populations and SCI articles
Barley, rice, bread and durum wheat doubled haploid lines (DH) production	Doubled haploid production through anther and / or isolated microspore *in vitro* culture from F1´s of great agronomic value selected by private companies or public research institutions	L. Cistué A.M. Castillo	Necessity of a growth chamber for mother plant growing under controlled conditions	2009	SCI articles will be published
	Production of Recombinant Chromosome Substitution Lines (RCSL) of the variety 'Albacete' in the variety 'Plaisant' for genetic studies of traits involved in gametic embryogenesis				
	Efficiency improvement of the androgenesis process through the application of different stress pre-treatments (types, duration and combinations)	A.M. Castillo L. Cistué		2009	SCI articles will be published
	Effect of the double-haploidization agent colchicine on embryogenesis and chromosome duplication				
Development of field trial machinery	Fitting and management of agronomic trials machinery (sowing, harvest, threshing, seed treatment, etc.) developed previously in-house	A. Galán		2009	Line discontinued. Retirement of researcher, 2009

ACTIONS	TASKS	RESPONSIBLE	CONDITIONS	TERM	OBSERVATIONS
Development of apricot cultivars and rootstocks	Selection of apricot-tree cultivars and clones Selection of new plum x apricot hybrid rootstocks	A. Arbeloa M. Herrero P. Andreu J.A. Marín	Collaboration with CITA-DGA in apricot	Apricot clone, 2007; rootstock pre-selection, 2009	New varieties and rootstocks will be obtained. SCI articles
Development of peach-tree varieties and rootstocks	*Prunus* rootstocks breeding and selection for iron chlorosis, root asphyxia, nematodes and soil fungi tolerance in the Mediterranean area, and for replanting situations. Peach breeding and selection of late and midseason cultivars, and conferring good fruit quality (peach, nectarine and peach flat). Rootstock-cultivar graft compatibility studies	M.A. Moreno Y. Gogorcena	Continuation of the breeding program	2009	New varieties and rootstocks will be obtained. SCI articles

General Objective II	**Improving the knowledge of plant yield-limiting fundamental processes to optimise our agricultural systems**				
Specific objective II.a	Fundamental processes in plants: photosynthesis and nitrogen fixation				
Characterization of the structure and function of the photosynthetic apparatus, with special emphasis in photosystem II	Structure and function of plant cytochrome b_{559}, spectral properties of P680 and P684, and study of characteristics and operation of paramagnetic centres induced during H_2O photosynthetic oxidation	R. Picorel I. Yruela	Collaboration with National Renewable Energy Laboratory-DOE, Ames Lab-Iowa State University, USA; ICMA, CSIC-University of Zaragoza	2008	SCI articles
Chloroplast lipid metabolism: characterization and regulation by light and redox state	Changes in the expression of the soybean desaturases previously cloned and sequenced in our laboratory (fab2, fad 2, fad3, fad6, fad7 and elongase kas II), in response to illumination changes, redox cellular state and temperature Role of membrane lipid fatty acids in PSII assembly. *Arabidopsis* mutants deficient in some desaturases will be used	M. Alfonso R. Picorel		2009	SCI articles
Symbiotic nitrogen fixation	Establishment of the roles of two groups of antioxidants (thiols and superoxide dismutases) in nodule development and activity. Production of transgenic lines with increased expression in nodules	M. Matamoros M.C. Rubio		2008	SCI articles. Results of potential interest for biotech companies
Specific objective II.b	Physiology of plants under abiotic stresses				
Characterization of plant responses to heavy metal toxicity	Studies on copper homeostasis in photosynthetic cells in control and copper-excess conditions. Sub-cellular copper distribution and transport and molecules involved Cloning of genes involved in copper transport. Studies on gene regulation in response to stress	I. Yruela R. Picorel		2009	SCI articles
Characterization of plant responses to stress using remote sensors	Characterization of changes in reflectance and fluorescence signals in response to drought, iron deficiency and excess of heavy metals. Stress monitoring in crops and natural vegetation at local, regional and global levels, using airborne and satellite remote sensors Evaluation of the possibility of detecting changes induced by drought and iron chlorosis with air-borne sensors	F. Morales	Participation in preparatory campaigns of the European Space agency (ESA) to implement satellites with hyper-spectral remote sensors	2009	SCI articles
Characterization of oxidative stress in legumes	Characterization of gene and antioxidant enzymes, studying the regulation in response to oxidative stress	M. Becana M. Matamoros		2009	SCI articles

ACTIONS	TASKS	RESPONSIBLE	CONDITIONS	TERM	OBSERVATIONS
Changes in the expression profiles of genes and proteins in plants in response to stress, using genomic and proteomic technologies	Study of expression profiles (transcriptome and proteome) in response to several types of abiotic stresses	M. Becana J. Ramos		2009	SCI articles. Results of potential interest for biotech companies
	Identification of the main targets of regulation through redox state changes in the chloroplast using nucleic acid microarrays	M. Alfonso R. Picorel		Starting 2007	SCI articles
	Study of changes in proteomes of xylem, phloem, root and shoot plasma membrane and tonoplast, mediated by Fe and Zn deficiencies and Fe, Zn, Cd and Pb toxicities, using 2-D, MALDI-TOF, and ESI/MS-MS Study of the regulation of enzymes involved in root metabolic activities (PEPC and others) as a consequence of Fe deficiency	A.F. López-Millán A. Abadía J. Abadía		2009	SCI articles
	Chloroplast proteome analysis under different copper regimes	I. Yruela R. Picorel		2009	SCI articles
Specific objective II.c	Optimisation of plant nutrition in a sustainable agriculture context				
Characterization of metal (Ca, Fe, Cu, Zn) homeostasis in plants (acquisition, transport, regulation, and storage): small molecules and proteins	Development of new analytical methodologies for the identification and quantification of small metal-chelating natural and synthetic molecules, and their metal chelates with Fe, Zn, Cd, and Pb in nutrient solutions and plant matrices Study of long-distance metal transport mediated by small molecules, proteins and peptides in the phloem and xylem of model plant species, with HPLC-MS (ESI/TOF) techniques, and stable metal isotopes	A. Álvarez-Fdez. A.F. López-Millán J. Abadía		2009	SCI articles
	Copper homeostasis in the chloroplast	I. Yruela R. Picorel		2009	SCI articles
Studies on induced alometry in fruit trees	Study and modelling of growth in fruit tree organs (at the macroscopic and cellular level), through the induction of alterations in the competition for nutrients between different sinks. Analysis of minerals and carbohydrates, accumulation and transport, and photosynthesis rates	A. Blanco E. Monge J. Val			SCI and dissemination articles
Development of methodologies for the diagnosis and correction of nutrient deficiencies in crops	Studies of fruit metabolic alterations related to calcium (*bitter pit*). Elaboration of a model for the sequence of events leading to the development of *bitter pit* through the elicitation of symptoms under laboratory conditions Optimisation of new technologies to carry out early diagnosis Development of fertilization technologies to increase fruit Ca levels and fruit quality	J. Val E.Monge A. Blanco		2009	SCI and dissemination articles. Potential for technological developments
	Characterization of changes produced by iron deficiency (iron chlorosis) on photosynthetic pigment composition, chlorophyll fluorescence signals and whole plant photosynthesis in sugar beet and *Arabidopsis*	F. Morales		2009	SCI articles
	Establishment of plant nutrient cycles, early diagnosis, and nutrient (Fe and Zn) deficiency correction technologies in fruit trees and model species	A. Abadía J. Abadía A. Álvarez-Fdez. V. Fernández		2009	SCI and dissemination articles. Potential for technological developments

ACTIONS	TASKS	RESPONSIBLE	CONDITIONS	TERM	OBSERVATIONS
Techniques for precision application of fertilizers	Study of the possibilities of using leaf spraying techniques as an efficient way to correct nutrient deficiencies in fruit orchards	V. Fernández A. Abadía		2009	SCI and dissemination articles
	Development of methods to increase calcium levels in fruits and, therefore, fruit quality. New procedures for calcium application though leaves, increasing calcium concentration in the solution, and calcium infiltration during postharvest applying vacuum are investigated	J. Val A. Blanco		2009	SCI and dissemination articles
Specific objective II.d	Reproductive biology				
Characterisation of the reproductive process, and its implications in fruit set	Pollination requirements and selection of pollinator cultivars	M. Herrero	Recently introduced line at the EEAD, and requiring scientific equipment; collaboration with the CITA-DGA and EELM-CSIC	Three PhD to be completed in 2007 (2) , and 2008	SCI articles
	Study of the mechanisms that regulate male-female interaction				
	Factors that affect fruit set: temperature and nutritive status				
General Objective III	**Development of environment friendly agricultural production systems**				
Specific objective III.a	Optimisation of soil use, characterization, degradation and conservation				
Evaluation and planning of soil use	Soil studies including the main chemical, physical and physiographical parameters to characterize soil types and associations. Thematic maps are created from these data bases by means of Geographical Information Systems	J. Machín		2009	SCI articles
	Use of automatic evaluation models and expert systems for soil evaluation and planning on an informed base				
Management and conservation of soils in dryland agrosystems: conservation tillage	Evaluation of the capabilities of different soil management systems to increase soil organic matter content, and to preserve soil structure	M.V. López J.L. Arrúe		2008	SCI articles
	Characterization of soil surface conditions relevant for wind erosion				
	Quantification of short and long-term CO_2 emissions under different tillage systems. Estimation of the capabilities of agricultural systems under arid environments for carbone sequestration				
	Study of soil water balance, and soil hydrological and physical properties under different soil management systems. Spatial and time variability of soil moisture and hydraulic properties	J.L. Arrúe M.V. López		2009	SCI articles
	Development of TDR methods (Time Domain Reflectometry) to measure soil moisture profiles and soil electrical conductivity				
Study of soil degradation: erosion and studies of environmental geochemistry	Measurement of soil erosion by means of radiometric techniques. Design of sampling strategies suitable for studying the whole cycle of soil loss-particle transport and deposition at basin scale, and calibration of cesium 137 data by using models adapted to the specific conditions of soils in Mediterranean environments	A. Navas	New scientific equipment and renewal of some of the existing items is required	2009	SCI articles
	Calculation of erosion rates under different conditions (soil use and morfphoedaphic environment). Modeling of erosion-deposition				
	Environmental Geochemistry: speciation and transfer of heavy metals, trace elements and radionuclides in different soils				
	Establishment of reference levels for heavy metals, and evaluation of soil quality				

ACTIONS	TASKS	RESPONSIBLE	CONDITIONS	TERM	OBSERVATIONS
Specific objective III.b	Optimisation of water use in irrigated agriculture				
Measurement and estimation of crop water requirements	Measurement and quantification of crop water requirements using micrometeorological sensors, automatic weather stations, weighing lysimeters and remote sensing over olive orchards, rice, corn, and alfalfa.	A. Martínez-Cob	Micrometeorological equipment and sap flow analyzer needed. Collaboration with remote sensing experts required	2008, except remote sensing, 2009	SCI and dissemination articles
Development of cropping methods to optimize crop water use, and minimize irrigation environmental impact	Dissemination of the results on sprinkler irrigated rice (extension projects)	J. Cavero	Scientific equipment needed	2009	SCI and dissemination articles
	Analysis of yield response of maize under nighttime vs. daytime irrigation, water drift and evaporation losses				
	Evaluation of strategies for the reduction of nitrate leaching in irrigated monocrop maize: catch crops, previous alfalfa crop effect, use of simulation models				
	Optimisation of the fertilization (nitrogen and other nutrients) related to an appropriate irrigation water management in vulnerable areas	E. Monge		2009	SCI and dissemination articles
Optimization of the design and the management of the irrigation systems and the irrigation districts	Optimisation of the design of sprinkler irrigation systems; new sprinkler irrigation materials; sprinkler irrigation modeling	E. Playán		Sprinkler irrigation simulation model in 2007; decision support system for sprinkler irrigation in 2009; intelligent sprinkler irrigation scheduling devices in 2009	SCI and dissemination articles. Potential for technological developments
	Development of a decision support system for irrigation at plot level, integrating irrigation and crop simulation models				
	Development of intelligent scheduling devices for sprinkler irrigation				
	Optimisation of water use in irrigation districts by means of the development of management tools. Real time management using computers. Improvement of the technological utilities of Ador (EEAD-CSIC registered software)	E. Playán	Sustained effort in order to keep the protection of ADOR is required	Software Ador, version 2.0, in 2008	Continuous development of technology for irrgation management
	Measurement of surface water quality and quantification of point and diffuse pollution factors due to both natural elements (halite, gypsum) and those derived from the irrigation systems (nitrates, phosphates and suspended sediments). Environmental impact of that pollution	J. Machín		2009	SCI and dissemination articles

4.4. CONDITIONS AND EXTERNAL TENDENCIES AND PROPOSED EVALUATION CRITERIA

4.4.1. Quality of research

The evaluation criteria for the EEAD will be:

- Quality and number of publications
- Number of publications listed in SCI
- Patents and registered plant material suitable for exploitation
- Achievement of competitive funding
- Positioning of the Institute on international projects
- Contracts/Agreements with the private sector
- Number of graduate students and postdocs

4.4.2. Research impact

The final users or our accomplishments are the **scientific community**, the **agro-food sector**, and the **general public**. Our impact must be measured on these three bodies. The research impact must be analysed from two closely related aspects: on the one hand, the social repercussion and the direct profits derived from the use and exploitation of patents and varieties developed by the Institute and, on the other hand, the scientific quality, which will be assessed according to the relevance of the journals in which the obtained results will be published and the number of citations received. Also, the impact of divulgative efforts to the general public must be assessed.

4.4.3. Generation of revenue

According to our experience and as observed over the last few years, we can be relatively optimistic about the potential to obtain sufficient funding from National resources to develop the proposed lines of research. This funding will essentially come from The National Plan for Scientific Research, Development and Technological Innovation, the CSIC, the Aragón Regional Government and contracts/agreements with the private sector. We also expect to participate increasingly in some EU-funded projects.

The private sector is becoming increasingly attracted by the innovation potential of the EEAD, as proved by the growing number of contracts signed during the last few years. Several lines of research have achieved results and products that are of direct interest to companies. We expect to sustain this trend over the next years.

4.4.4. Added value

The size of the Institute, and the complementariness of the research groups, with a functional structure that permits to develop studies on plant material, studies of basic processes, and agronomic evaluation, allows the EEAD to tackle relevant agricultural problems from a comprehensive perspective.

Our role as a reference institute in Spain's agricultural research contributes to the CSIC's leadership in research for temperate and semi-arid areas. Joining our added value with that of other Institutes that play a similar role for arid or humid zones, the CSIC can offer a complete response to the challenges faced by Spanish agriculture across all existing environments.

The location of EEAD on the Aula Dei Campus facilitates the projection of our activity in Aragón, through collaboration with CITA-DGA, and on the Mediterranean area through collaboration with the IAMZ-CIHEAM.

5. ACTIONS TO ACHIEVE OBJECTIVES

5.1. ORGANIZATION

The current managerial structure shall be maintained, although adjustments may be needed in the future, in case the CSIC adopts a new administrative model.

Steps will be taken to put into practice new, more flexible and efficient management tools to achieve the goals stated in the mission and objectives of the Institute.

We have detected the necessity of setting up our own instrument to facilitate links with companies of the same sector, with the aim to increase the level of funding through private contracts. We propose the creation of a new technology transfer office (TTO), including the opening of a new position that will depend on the Management of the Institute.

The participation of graduate students and postdocs in scientific activities of the Institute will be encouraged.

Security issues must be taken into account in all actions to be implemented in the next years. We must consolidate a culture of risk prevention as an integral part of the professional research activity of the Institute.

5.2. SPACE AND LOCALIZATION

Within the period envisaged in this plan, and taking into consideration the expected increase in work volume, an increment in the space dedicated to laboratories and offices will be required. The EEAD has always considered the construction of the west wing of the Institute, proposed in the initial project, but never built. There is land available for this, and a new building can be planned either as part of a joint initiative within the Campus (i.e. the setting up of a Scientific-Technological Park), or as a separate CSIC action. A new two story building, totalling 2000 m^2 (approximate cost 3.5 M €), would ensure enough workspace to allocate new staff and equipment in the forthcoming years.

We also propose completing the reforms of the 2nd semi-floor of the main building, which will be turned into a space independent of the Departments, with eight offices for temporary personnel and visitors. These offices will be assigned directly by the Director of the Institute. Centralized air conditioning in the main building is also needed (approximate cost 0.3 M €), to improve working conditions, and to comply with safety regulations.

Enhancements will be made to the infrastructure of the Centre by improving the electrical installations, the drinking water supply, the computer network, reprography, and the garden. They will be modernized and adapted to the existing labour security regulatory framework, and extended in response to the anticipated increase in demand.

5.3. SCIENTIFIC INFRASTRUCTURE

The scientific equipment necessary for field research should be updated and the necessary laboratory equipment acquired. In this last case, and according to the proposed strategy, we will try to complement the existing equipment for genomics, proteomics, metabolomics, and ionomics. Current greenhouses (except one) are either old, and operative just a few months every year, or plainly out of order for safety reasons. New greenhouse space, with adequate environmental control and operative year-round would enhance the capacities of most researchers at the EEAD, and of the three research lines. Also, as several groups work with GMOs, a new greenhouse with confinement conditions according to legal stipulations for GMOs will be sought after. Growth chamber space will also be in shortage if scientific personnel keeps growing at the same trend as for the past 20 years. A facility with new growth chambers will be necessary to meet growing research demands. Scientific equipment to reinforce all three lines of research of the EEAD will be sought, in a synchronized manner with the development of the potential of each research line. In particular, the research lines would be reinforced by the acquisition and renovation of some of the equipment detailed in the plans prepared by the research groups (Annex 2), without discarding the possibility of acquiring other equipment.

During the five years span contemplated in this plan, the EEAD will apply for regional and national funding to replace scientific equipment whose operational life-span will finish within the mentioned period (Table 5.3.1). The research groups will also apply for some of the equipment in their funding proposals.

Table 5.3.1. New scientific equipment and scientific equipment whose operational life span ends within 2005-2009.

Year	Equipment	Research line	Cost (estimated)	Rationale
2006	Nano-HPLC	2	88.000	High resolution liquid nano-chromatography allows accurate separation of proteins and peptides in samples of very low volumes. It gives to access to the study of cellular compartments and tissues of fruits and plants, and will complement the proteomics and metabolomics equipment already existing at the EEAD.
2006	Spot-cutter for 2-D gels	2	83.000	Automated protein isolation from 2-D gels. It will suppose an increase of work thoughput, precision and repeatability in the proteomics area.
2007	C and N analyzer for large samples	3	95.000	Capacity to make determinations of C and N in macrosamples of soil and plants, in a simple, fast and precise manner. It will allow the discrimination of organic and inorganic C, of great applicability and utility in agronomy studies.
2007	Ultramicrotome	1-2	65.000	Qualitative jump in histochemistry techniques, that will allow the access to the cellular level.
2008	Equipments for plant-soil gas exchange measurement	2-3	70.000	Equipments needed for physiology and agronomy studies of crops. Accomplishment of measures at the plot level, considering the vegetal mass as a whole, and at the level of leaf and small soil surfaces.
2008	Cereal field trial sowing machine	1-3	83.000	Essential equipment for field research. Being the capacity of phenotipation one of EEAD strengths, the renovation of these equipment is of strategic importance. Current equipment is old and in poor condition.
2009	Greenhouses	1-2-3	220.000	Necessity of growth of plants under controlled conditions of light and temperature, in small manageable units (cubicles, three at least, built in modular fashion to allow the addition of further units in the future). This essential type of infrastructure is completely lacking in EEAD. It will be managed as a general service of the Institute, with tariffs by surface and time of use, and run by specialized technical personnel, as referred in section 5.5.
2009	Ultracentrifuge	2	64.000	Equipment needed for the purification of proteins, routinely used in the Institute. Curent equipment is 18 years old, and its maintenance is very problematic by lack of spare parts.
	Real time PCR	1-2	69.000	Real time PCR for allelic discrimination for known SNPs. It will allow relatively high throughput for applications with low number of genes and elevated number of samples. Also, it is necessary for the increasing demand of genetic expression studies. Current Real time PCR is saturated. It will be an equipment of general use (3 departments).
	Freezers -80º (2)	1-2	32.000	Equipment necessary to replace an already obsolete freezer and to meet increasing demand at the Institute. Equipment of general use (3 departments).
	Growth chambers facility	1-2-3	200.000	Infrastructure with at least 3 growth chambers of varied sizes and diverse uses, to optimize its functionality. These chambers will give service to the increasing demands of the research groups. There will be a shortage of growth chamber space in the near future. The facility can be built in a modular manner, according to availability of funds, until completing the installation. Equipment of general use for the Institute.
	Equipment for gas exchange measurement	3	65.000	Unit to complete the equipment of this nature to be acquired in 2008.
	Laser difraction equipment for particle size analysis	3	75.000	Replacement of basic equipment of routine use for all the research lines of investigation of the present Soil Department.
	Orbital incubator	2	24.000	Replacement of already existing equipmen. There are two at the Institute, and must be replaced timely to avoid the danger of loss of biological samples.
	DHPLC	1-2	120.000	Genomics equipment to detect mutations or polymorphisms of DNA at large scale and low cost.
	Cold centrifuge, and rotors	1-2	46.000	Replacement of equipment anticipated before 2009, of essential use for the preparation of samples for three departments.
	Protein characterization equipment	2	43.000	Replacement of FPLC and bath with temperature control for the treatment and processing of samples for protein separation.

	Cereal combine harvester	1	150.000	Replacement of essential equipment for field research. The capacity of phenoptipation is one of EEAD strengths, so the replacement of this equipment is of strategic importance. The present equipment is old and is in poor condition. Use by two departments.
	Histology equipment	1-2	47.000	Implementation of necessary equipment for the histologic study of the adaptive changes of plants.
	Ionic chromatography for anion analysis	2-3	40.000	Increase of the capacity of chemical analysis of the Institute .
	Equipment for sap flow measurement	3	40.000	Equipment for the analysis of water use efficiency at plant level.
	Gas chromatographer	1-2	28.000	Equipment for the analysis of anions and ethylene in fruits.
	N and S analyzer	1-2-3	60.000	Replacement of the existing equipment in the Analysis Service of the Institute.
	Flame atomic absorption spectroscopy equipment (FAAS)	1-2-3	50.000	Replacement of the existing equipment in the Analysis Service of the Institute.
	HPLC	1-2	46.000	Replacement of equipment of basic use in several laboratories.
	HPLC, UV-Vis	1-2	25.000	Replacement of equipment of basic use in several laboratories.
	Equipment for acid digestion of fruit samples	1-2	43.000	Equipment to increase the capacity of analysis of fruits, and to reinforce research in the area of quality of the fruits.

Table 5.3.2. New scientific equipment, and other strategic activities, with funding commitment from the CSIC. I

Year	Equipment	Research line	Cost (estimated)	Rationale
2006	Nano-HPLC	2	88.000	High resolution liquid nano-chromatography allows accurate separation of proteins and peptides in samples of very low volumes. It gives to access to the study of cellular compartments and tissues of fruits and plants, and will complement the proteomics and metabolomics equipment already existing at the EEAD.
2006	Spot-cutter for 2-D gels	2	83.000	Automated protein isolation from 2-D gels. It will suppose an increase of work thoughput, precision and repeatability in the proteomics area.
2007	C and N analyzer for large samples	3	95.000	Capacity to make determinations of C and N in macrosamples of soil and plants, in a simple, fast and precise manner. It will allow the discrimination of organic and inorganic C, of great applicability and utility in agronomy studies.
2007	Ultramicrotome	1-2	65.000	Qualitative jump in histochemistry techniques, that will allow the access to the cellular level.
2008	Equipments for plant-soil gas exchange measurement	2-3	70.000	Equipments needed for physiology and agronomy studies of crops. Accomplishment of measures at the plot level, considering the vegetal mass as a whole, and at the level of leaf and small soil surfaces.
2008	Cereal field trial sowing machine	1-3	83.000	Essential equipment for field research. Being the capacity of phenotipation one of EEAD strengths, the renovation of these equipment is of strategic importance. Current equipment is old and in poor condition.
2009	Greenhouses	1-2-3	220.000	Necessity of growth of plants under controlled conditions of light and temperature, in small manageable units (cubicles, three at least, built in modular fashion to allow the addition of further units in the future). This essential type of infrastructure is completely lacking in EEAD. It will be managed as a general service of the Institute, with tariffs by surface and time of use, and run by specialized technical personnel, as referred in section 5.5.
2009	Ultracentrifuge	2	64.000	Equipment needed for the purification of proteins, routinely used in the Institute. Curent equipment is 18 years old, and its maintenance is very problematic by lack of spare parts.
2006-2009	Germplasm banks	1	62.000	Maintenance of germplasm collections of crops.
2006-2009	Long-term field experiments	3	10.000	Maintenance of long term tilling experiments.

Table 5.3.3. New scientific equipment and scientific equipment whose operational life span ends within 2005-2009, without funding commitment.

Equipo	Línea de investigación	Coste estimado	Justificación
Real time PCR	1-2	69.000	Real time PCR for allelic discrimination for known SNPs. It will allow relatively high throughput for applications with low number of genes and elevated number of samples. Also, it is necessary for the increasing demand of genetic expression studies. Current Real time PCR is saturated. It will be an equipment of general use (3 departments).
Freezers -80º (2)	1-2	32.000	Equipment necessary to replace an already obsolete freezer and to meet increasing demand at the Institute. Equipment of general use (3 departments).
Growth chambers facility	1-2-3	200.000	Infrastructure with at least 3 growth chambers of varied sizes and diverse uses, to optimize its functionality. These chambers will give service to the increasing demands of the research groups. There will be a shortage of growth chamber space in the near future. The facility can be built in a modular manner, according to availability of funds, until completing the installation. Equipment of general use for the Institute.
Equipment for gas exchange measurement	3	65.000	Unit to complete the equipment of this nature to be acquired in 2008.
Laser difraction equipment for particle size analysis	3	75.000	Replacement of basic equipment of routine use for all the research lines of investigation of the present Soil Department.
Orbital incubator	2	24.000	Replacement of already existing equipmen. There are two at the Institute, and must be replaced timely to avoid the danger of loss of biological samples.
DHPLC	1-2	120.000	Genomics equipment to detect mutations or polymorphisms of DNA at large scale and low cost.
Cold centrifuge, and rotors	1-2	46.000	Replacement of equipment anticipated before 2009, of essential use for the preparation of samples for three departments.
Protein characterization equipment	2	43.000	Replacement of FPLC and bath with temperature control for the treatment and processing of samples for protein separation.
Cereal combine harvester	1	150.000	Replacement of essential equipment for field research. The capacity of phenoptipation is one of EEAD strengths, so the replacement of this equipment is of strategic importance. The present equipment is old and is in poor condition. Use by two departments.
Histology equipment	1-2	47.000	Implementation of necessary equipment for the histologic study of the adaptive changes of plants.
Ionic chromatography for anion analysis	2-3	40.000	Increase of the capacity of chemical analysis of the Institute .
Equipment for sap flow measurement	3	40.000	Equipment for the analysis of water use efficiency at plant level.
Gas chromatographer	1-2	28.000	Equipment for the analysis of anions and ethylene in fruits.
N and S analyzer	1-2-3	60.000	Replacement of the existing equipment in the Analysis Service of the Institute.
Flame atomic absorption spectroscopy equipment (FAAS)	1-2-3	50.000	Replacement of the existing equipment in the Analysis Service of the Institute.
HPLC	1-2	46.000	Replacement of equipment of basic use in several laboratories.
HPLC, UV-Vis	1-2	25.000	Replacement of equipment of basic use in several laboratories.
Equipment for acid digestion of fruit samples	1-2	43.000	Equipment to increase the capacity of analysis of fruits, and to reinforce research in the area of quality of the fruits.

5.4. HUMAN RESOURCES

5.4.1. Retirements

Table 5.4.1. Retirements and leaves expected for the period 2005-2009.

Retirements	2005	2006	2007	2008	2009	Total 2005-2009
Scientists, staff	-	-	-	1	2	3
Postdocs	1	1	-	3	2	7
Graduate students	7	6	4	6	-	23
Research support, civil servants	2	-	1	1	1	5
Research support, permanent positions	1	-	-	-	-	1
Research support, temporary contracts	6	9	3	-	-	18
General services personnel	-	-	-	-	1	-
Support units personnel	-	-	-	-	-	-
OVERALL	17	16	8	11	6	58

5.4.2. New positions

The new positions for scientific personnel that are planned during the strategic plan period have been organized in profiles according to the three main research objectives of the Institute (Tables 1.4 and 4.1). Taking into account the training capacity, the evolution trend of the research groups, and the implementation of the strategies defined for the 2005-2009 period, the following new positions for scientific personnel are planned:

1. **Phytogenetic resources and plant breeding**: between four and six positions.
2. **Improving the knowledge of plant yield-limiting fundamental processes to optimise our agricultural systems**: between five and eight positions.
3. **Development of environment friendly agricultural production systems**: between four and six positions.

One criterion for the request of scientific positions will be the existence of qualified postdoctoral researchers, preferably those with a *Ramón y Cajal* contract, but also with other types of competitive contracts. Another will be the need to update the Institute's expertise in strategic areas. When there is a possibility to obtain a new research post at the Institute, our needs will be revised, the candidates checked, and a decision will be made on the request depending on the scientific capacity of the candidates, the potential to broaden and complement the research capacity of the Centre, and the criteria of adequacy to the prevailing scientific policy.

The number of scientific personnel in the EEAD has grown notably in the last years. However, the number of assistant personnel remains stable. Even though this fact has been alleviated via temporary employment using project funds, it would be desirable to prevent as much as possible the decrease of the technical-to-scientific personnel ratio, to avoid risking the scientific quality and productivity of the research groups. There is a need for qualified technicians (college degree) for the general research services of the Institute described in section 5.6.2 (two for genomics, proteomics, and metabolomics; one for the Analysis Service; one for the greenhouses and growth chambers), and a Technology Transfer position, as described in section 5.1. Another college degree position is needed to manage all new research services implemented at the Institute. Four college degree positions are requested to support field research. Two college degree technician positions are requested to secure current interim positions. Eight other technicians are also requested, to support the four scientific Departments specific needs. Three positions for general services of the Institute will be needed to keep up with the workload increase, one in maintenance, two in the Field Suport Unit (Table 5.4.2). Also, the increase of the Institute's personnel and volume of the scientific activities, request a matching increase of the capacities of all services. Therefore, there is a need of qualified personnel (University level) for the General Services unit, one to be responsible for the general infrastructures, and another one for Administration. In general, the positions in charge of all units and services of the Institute should achieve a hierarchy level according to the level of their duties.

One of the areas where this problem is already critical is in computer services. It is a top priority for the Institute to have personnel to professionally manage the computer facilities as a requisite to attain a proper functioning of the Institute in an scenario of huge demands of communications and information technologies in the R+D system. The following positions are thus requested:

Table 5.4.2. New positions required for until 2009.

Positions	2006	2007	2008	2009	Total
	WITH funding committement from CSIC				**54**
Graduate students (4 years)	3	4	4	4	15
Postdocs (3 years)	3	3	2	4	12
Technicians/management (2 years)	4	4	4	4	16
Tenured scientists (staff)	3	3	2	3	11
	WITHOUT funding committement from CSIC				**26**
Full University degree technicians (TTO, and two for research Services, Genomics and Proteomics)	1	-	1	1	3
Full or Intermediate University degree technicians (two for reserch Services: Greenhouses and growth chambers, and Analysis Service)	-	2	1	1	4
Intermediate University degree for general services of the Institute (management of Research Services of the Institute)	-	1	-	-	1
Intermediate University degree technicians to support field research	-	2	1	1	4
Other research support technicians ("ayudantes" and "auxiliares")		3	2	3	8
Computer technician for the Institute	-	1	-	-	1
Intermediate University degree technician for Maintenance and infrastructures	1	-	-	-	1
General services technicians (maintenance, field research support unit, "FP1" or "FP2" degree)	-	1	1	1	3
Management, intermediate University degree	-		1	-	1

Besides the positions listed in the table above, vacancies originated by retirements will be covered conveniently, taking into account the prevailing needs.

5.5. ECONOMIC RESOURCES

Table 5.5. Expected revenues for the period 2005-2009.

Tabla 5.5. Evolution of the prospective budget (in euros)						
Years	**2005**	**2006**	**2007**	**2008**	**2009**	**Total 2005-9**
Total budget	5.290.000	5.128.000	5.365.000	5.400.000	5.660.500	26.843.500
Total external resources[1]	1.300.000	1.100.000	1.200.000	1.100.000	1.200.000	5.900.000
Total internal resources	3.990.000	4.028.000	4.165.000	4.300.000	4.460.500	20.943.500
Personnel budget[2]	3.200.000	3.300.000	3.400.000	3.500.000	3.600.000	17.000.000
Ordinary budget[3]	290.000	328.000	340.000	350.000	360.500	1.668.500
Investments[4]	500.000	400.000	425.000	450.000	500.000	2.275.000

[1,2,3,4] see footnote at Table 2.3

A significant part of the investments chapter over the past five-year period came from contributions from the European Union structural funds (EFRD). The total figure for investments during the next period will depend heavily on the new European funding share structure, after the enlargement of the EU to 25 countries.

5.6. SCIENTIFIC – TECHNOLOGICAL PROJECTS

5.6.1. Departments

The current department structure will be updated to achieve an organization better suited to the current objectives of the research groups, and to attain a more balanced Department structure. It is proposed that the two groups that constitute the Department of Soil Science (*Soil Physics and Conservation Tillage*, and *Erosion, and Soil and Water Evaluation*), and the group of *Irrigation, Agronomy and Environment,* form a new department. This new department will focus on research on the subjects of soil, water, and agronomy.

5.6.2. Services

The Institute should implement several platforms to provide facilities for the support of research groups. The services provided so far support the research of the Institute groups and collaborators, as a consequence of limited analysis throughput because of unsuficient human resources. It is intended, however, to make the singular equipment of EEAD available to other researchers from CSIC, and to other external users. Thus, platforms will be created or enhanced to meet research needs, with prior agreement of the research groups, and sanctioning of their rules of operation by the managerial bodies of the Institute. The Field Research Support Unit and the Analysis Laboratory already operate in this way. All greenhouses and nurseries facilities, and the new growth chambers, should be a centralized service of the Institute, managed by a technician with college degree. The scope of the Analysis Laboratory will be enlarged, placing under its responsibility the operation of more scientific equipment already existent, to become a larger ionomics platform to serve the Institute. We will endeavour to get college level technicians to run this service, which will allow its operation for external users as well. This action would facilitate operations to meet the demand with the expected increase in work load.

The work capacity of the genomics, proteomics, and metabolomics areas has increased remarkably in recent years. These areas might be managed more efficiently under a common structure. The equipment is already located in common laboratories, and the evolution towards service platforms will be straightforward. The optimum use of this equipment, and the implementation of services for internal and external users will require the appointment of college level technicians (one for genomics, one for proteomics).

Besides, other large scientific equipment and facilities will be organized as Services for the Institute. These new Services will be managed following a general set of rules that will have to be approved by the Executive Board.

5.6.3. External relations

In order to create a Scientific-Technologic Park on the Aula Dei Campus, the Institute will undertake and support initiatives in collaboration with the Aragon Government and other organizations established on Campus.

The formalization of new educational agreements with universities, other higher education centres, and professional education centres will be promoted, to maintain or increase the number of PhD and MsC students, and persons undergoing other kinds of training at the Institute.

Cooperation with private companies will be one of the main objectives to be developed by the OTT office; its creation will be promoted by the EEAD.

The status of the Associated Laboratory of Agronomy and Environment created in 1992 between the EEAD and SIA (currently CITA) and constituted by the Soil and Irrigation department and the Genetics and Plant Production Department (EEAD) will be updated.

5.7. ACTIVITIES FOR THE DEVELOPMENT OF SCIENTIFIC CULTURE OR DISSEMINATION

The strategy of the promotion of scientific culture described in 3.5 will proceed. As these activities have been increased during the last years we expect that this trend will continue in the future. In fact, the promotion of scientific culture has been included in the forward-looking approach of EEAD for the next five-year period. In this sense, the spread of Science outside the borders of the Institute will be promoted by participating in activities organized by educational centres and other social institutions. The Zaragoza International Exhibition 2008, centered on water and sustainability, will be an excellent opportunity to bring some of our activities closer to the society. The EEAD and CSIC will promote participation in any activities related to Zaragoza-2008.

5.8. RESULT INDICATORS FOR RESEARCH ACTIVITIES

The indicator values proposed by EEAD to evaluate its scientific activity during the five year period 2005-2009 are shown in Table 5.8. All research carried out at the EEAD-CSIC should be published and/or divulgated through the appropriate scientific and professional publications. An increase in the number of SCI indexed articles published is sought (10.5 % over past five-year period). Additionally, as described in *Research Strategy* section (4.3), an increase of the impact of the research will be pursued, by aiming at publication of research works in higher quality journals of each discipline.

Table 5.8. Prospective values for general indicators

Table 5.8. Prospective values for general indicators (Institute)						
Year	**2005**	**2006**	**2007**	**2008**	**2009**	**Total 2005/9**
Total financing (euros) in competitive projects	955.356	975.075	930.524	990.667	838.667	**4.690.289**
Total nº articles in SCI/SSCI/A&HIS-indexed journals	29	33	36	39	42	**179**
Nº articles in international non- ISI journals	6	7	6	6	7	**32**
Nº articles in national non- ISI journals	11	11	11	11	11	**55**
Nº books	1	1	1	1	1	**5**
Portfolio of active national patents	9	10	10	12	14	**14**
Portfolio of active EPO, USPTO, etc. patents	3	3	3	3	5	**5**
Patents licensed to companies	4	5	6	6	8	**8**
Start-ups initiated by Center/Institute personnel						**-**
Income from R&D contracts (private sector)	85.000	127.500	90.000	90.000	90.000	**482.500**
Income from contracts/consulting (public sector)	15.000	-	10.000	10.000	10.000	**45.000**
Total stock predoctoral fellowships/contracts	17	17	17	19	19	**45**
Total stock postdoctoral fellowships/contracts	5	8	6	8	8	**20**
Total PhD theses defended by C/I personnel	4	7	9	6	7	**33**
Total doctoral/postgraduate course credits	9	6	8	6	8	**37**

The values in this table were calculated using the same principles as for the Tables 3.1, 3.3.1, and 3.3.2. Thus, for the items of "total financing from competitive projects", "income from R&D contracts (private sector)", and "income from contracts/consulting (public sector)", the comparison of the past five-year period (2000-2004) and the next (2005-2009), must be carried out between values in Table 5.8 and the amounts summarized in Tables 3.1, 3.3.1, and 3.3.2, respectively.

INDEX TO THE PROPOSED STRATEGIC PLAN

Estación Experimental de Aula Dei
CSIC
Zaragoza, May 2006

ANNEX 1

SOIL SCIENCE

2.

Table 2.1. Human resources					
Responsible					
Arrúe Ugarte, José Luis					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total scientific staff personnel	**4**	**4**	**4**	**4**	**4**
Nº Research Professors	-	-	-	-	-
Nº Scientific Investigators	1	1	2	1	1
Nº Staff Research Scientists	3	3	2	3	3
Nº University Professors (joint C/I only)	-	-	-	-	-
Nº Associate Professors (joint C/I only)	-	-	-	-	-
Nº Other Univ. Professors in other categories (joint C/I only)	-	-	-	-	-
Nº "Investigadores Titulares"	-	-	-	-	-
Nº "Doctores vinculados"	-	-	-	-	-
Total contracted postdoctoral personnel	**1**	**1**	**1**	**-**	**-**
Nº Ramón y Cajal contracts	-	-	-	-	-
Nº I3P doctors	-	-	-	-	-
Other contracted doctors/postdoctoral fellowship	1	1	1	-	-
Total predoctoral personnel	**1**	**1**	**2**	**2**	**2**
Nº predoctoral FPI and FPU fellowships	1	1	2	2	2
Nº predoctoral I3P fellowships	-	-	-	-	-
Other contracted predoctorals/predoctoral fellows	-	-	-	-	-
Total civil service research support personnel	**3**	**3**	**3**	**3**	**3**
"Titulados Superiores" (University graduates)	-	-	-	-	-
"Titulados de grado medio"	-	-	-	-	-
Laboratory assistants	3	3	3	3	3
Research auxiliaries	-	-	-	-	-
Total research support personnel (permanent)	**2**	**2**	**2**	**2**	**2**
Total contracted research support personnel	**-**	**-**	**-**	**-**	**1**
Total general services personnel	**1**	**1**	**1**	**1**	**1**
Total support unit personnel	**-**	**-**	**-**	**-**	**-**

Table 2.2. Acquisition of equipment (more than 60,000 euros) in the last 5 years					
Responsible					
Arrúe Ugarte, José Luis					
Equipment	**Year of purchase**	**Purchase cost (euros)**	**Annual maintenance cost**	**Date end of useful life**	**Observations**
Sistema de espectrometría gamma de alta resolución	2004	65.000,00	6.000,00	2022 - 2024	

3.

Table 3.1. Competitive financing obtained						
Responsible						
Arrúe Ugarte, José Luis						
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000/4**
Nº National Plan projects	-	1	1	-	1	**3**
Nº PROFIT projects	-	-	-	-	-	**-**
Nº. FIS projects	-	-	-	-	-	**-**
Nº INIA projects	-	-	-	-	-	**-**
Nº projects/networks Framework R&D Programme	-	-	-	-	1	**1**
Nº regional government projects	1	-	-	-	1	**2**
Nº private foundation projects	-	-	-	-	-	**-**
Other competitive projects	-	-	-	-	-	**-**
Total Nº competitive projects	**1**	**1**	**1**	**-**	**3**	**6**
Nº of FTE involved in the approved projects	**1,00**	**4,00**	**2,00**	**-**	**4,00**	**11,00**
Financing (euros) National Plan projects	-	121.644,85	89.150,00	-	122.310,00	**333.104,85**
Financing (euros) PROFIT projects	-	-	-	-	-	**-**
Financing (euros) FIS projects	-	-	-	-	-	**-**
Financing (euros) INIA projects	-	-	-	-	-	**-**
Financing (euros) projects/networks Framework R&D Programme	-	-	-	-	39.400,00	**39.400,00**
Financing (euros) regional government projects	18.030,36	-	-	-	5.909,70	**23.940,06**
Financing (euros) private foundation projects	-	-	-	-	-	**-**
Financing (euros) other competitive projects	-	-	-	-	-	**-**
Total Financing (euros) competitive projects	**18.030,36**	**121.644,85**	**89.150,00**	**-**	**167.619,70**	**396.444,91**

Table 3.2.1. ISI-indexed scientific production						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total Nº articles in SCI/SSCI/A&HIS-indexed journals	**6**	**1**	**3**	**5**	**4**	**19**
List of up to 20 ISI-indexed journals most relevant to the Centre/Institute's activity and articles in them (indicate the nº of articles published in each)	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Quaternary International (1,422)	1	-	-	-	1	**2**
Ambio (1,123)	1	-	-	-	-	**1**
Applied Geochemistry (1,804)	-	-	1	-	-	**1**
Applied Radiation and Isotopes (0,690)	-	-	1	-	-	**1**
Catena (1,083)	-	-	-	1	-	**1**
Environmental International (1,226)	-	-	-	1	-	**1**
European Journal of Agronomy (0,953)	1	-	-	-	-	**1**
European Journal of Soil Science (1,623)	-	-	1	-	-	**1**
Hydrology and Earth System Sciences (0,948)	-	-	-	-	1	**1**
Journal of Arid Environments (0,692)	-	-	-	-	1	**1**
Journal of Hydrology (1,354)	-	-	-	-	1	**1**
Journal of Hydrometeorology (2,862)	-	-	-	1	-	**1**
Journal of Paleolimnology (2,333)	1	-	-	-	-	**1**
Journal of Soil and Water Conservation (0,847)	-	1	-	-	-	**1**
Land Degradation and Development (0,882)	1	-	-	-	-	**1**
Palaeogeography, Palaeoclimatology, Palaeocology (1,776)	-	-	-	1	-	**1**
Sedimentology (1,615)	1	-	-	-	-	**1**
Soil & Tillage Research (1,310)	-	-	-	1	-	**1**

Table 3.2.2. Non-ISI scientific production						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº articles in international NON-ISI journals	-	-	1	1	1	**3**
Nº articles in national NON-ISI journals	-	2	-	1	6	**9**
Nº chapters in books/Collective works*	-	-	3	2	-	**5**
Nº collective works edited/directed*	-	-	-	-	-	**-**
Nº books	-	-	-	-	-	**-**

**** Collective works do not include meeting proceedings***

Table 3.2.3. Congresses and editorial activity						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total presentations at national congresses	**1**	**2**	**1**	**9**	**5**	**18**
Invited presentations at national congresses	2	-	-	-	2	**4**
Organizers/Members of scientific committees for national congresses	-	-	-	-	-	**-**
Total presentations at international congresses	**4**	**9**	**8**	**4**	**6**	**31**
Invited presentations at international congresses	-	-	-	-	-	**-**
Organizers/Members of scientific committees for international congresses	-	-	-	-	-	**-**
Editors/Directors of ISI journals	-	-	-	-	-	**-**
Editors/Directors of international non-ISI journals	-	-	-	-	-	**-**
Editors/Directors of national non-ISI journals	-	-	-	-	-	**-**
Board members of ISI journals	-	-	-	-	-	**-**
Board members of international non-ISI journals	-	-	-	-	-	**-**
Board members of national non-ISI journals	-	-	-	-	-	**-**

Table 3.2.4. Patents						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
NATIONAL patents applied for	-	-	-	-	-	**-**
NATIONAL patents obtained	-	-	-	-	-	**-**
EPO patents applied for	-	-	-	-	-	**-**
EPO patents obtained	-	-	-	-	-	**-**
PCT patents applied for	-	-	-	-	-	**-**
PCT patents obtained	-	-	-	-	-	**-**
USPTO patents applied for	-	-	-	-	-	**-**
USPTO patents obtained	-	-	-	-	-	**-**
Portfolio active national patents	-	-	-	-	-	**-**
Portfolio active patents EPO, USPTO, etc.	-	-	-	-	-	**-**

Table 3.2.5. Technology transfer						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Patents licensed to companies	-	-	-	-	-	**-**
Patentes in exploitation	-	-	-	-	-	**-**
Revenues of licensed/exploited patents	-	-	-	-	-	**-**
Start-ups initiated by Centre/Institute personnel	-	-	-	-	-	**-**
Nº persons del C/I related to Start-ups	-	-	-	-	-	**-**

Table 3.3.1. Contracts and services to companies						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	1	-	-	-	-	**1**
Revenues from R&D contracts	18.961,93	-	-	-	-	**18.961,93**
Nº de technological or advisory services	-	1	-	-	-	**1**
Revenues from service or advisory contracts	-	1.358,29	-	-	-	**1.358,29**

Table 3.3.2. Contracts and agreements with the public sector						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	1	-	-	-	-	**1**
Revenues from R&D contracts	9.869,81	-	-	-	-	**9.869,81**
Nº advisory services	-	-	-	-	-	**-**
Revenues from advisory contracts/agreements	-	-	-	-	-	**-**
Associated R&D units	-	-	-	-	-	**-**

Table 3.3.3 Assessment						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº ANEP coordinators/assistant	-	-	-	-	-	**-**
Nº managers/assistant PN	-	-	-	-	-	**-**
Nº National Plan selection commission members	-	-	-	-	-	**-**
Nº regional government selection commission members	-	-	-	-	-	**-**
Nº evaluations as HLG en EU	-	-	-	-	-	**-**
Other expert advisory committees	-	-	-	-	-	**-**

Table 3.3.4. Internationalization						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº projects/networks Framework R&D Programme	-	-	-	-	1	**1**
Nº projects in other European or international programs	-	-	-	-	-	**-**
Non-Spanish staff research personnel	-	-	-	-	-	**-**
Postdoctoral personnel contracted with non-Spanish funds	-	-	-	-	-	**-**
Foreign researchers on sabbatical and visiting professors (minimum 6 months)	-	-	-	-	-	**-**
Integrated actions and other bi(multi)lateral collaborations	-	-	-	1	2	**3**

Table 3.4. Formative activity						
Responsible						
Arrúe Ugarte, José Luis						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total predoctoral fellowships/contracts granted	**-**	**-**	**1**	**1**	**-**	**2**
Predoctoral FPI fellowships granted	-	-	1	1	-	**2**
Predoctoral FPU fellowships granted	-	-	-	-	-	**-**
Predoctoral Regional Government fellowships/contracts granted *	-	-	-	-	-	**-**
Predoctoral I3P fellowships	-	-	-	-	-	**-**
Postgraduate I3P fellowships	-	-	-	-	-	**-**
Other predoctoral fellowships/contracts granted*	-	-	-	-	-	**-**
Total stock predoctoral fellowships/contracts	**1**	**1**	**2**	**2**	**2**	**3**
Total predoctoral project fellowships/contracts granted (in equivalent/year)	**-**	**-**	**-**	**-**	**-**	**-**
Total postdoctoral fellowships/contracts	**-**	**-**	**-**	**-**	**-**	**-**
Total Ramon y Cajal contracts granted	-	-	-	-	-	**-**
Total Juan de la Cierva contracts	-	-	-	-	-	**-**
AC post-doctoral contracts granted*	-	-	-	-	-	**-**
Total Postdoctoral I3P doctor granted	-	-	-	-	-	**-**
Other postdoctoral fellowships/contracts granted*	-	-	-	-	-	**-**
Total stock postdoctoral contracts	**1**	**1**	**-**	**-**	**-**	**1**
Total postdoctoral project fellowships/contracts granted (in equivalent/year)	**-**	**-**	**0,75**	**0,42**	**0,40**	**1,57**
Total technical I3P contracts granted	**-**	**-**	**-**	**-**	**1**	**1**
Total MEC contracts for technical personnel	**-**	**-**	**-**	**-**	**-**	**-**
Other contracts for technical personnel	**-**	**-**	**-**	**-**	**-**	**-**
Total doctoral theses directed by C/I personnel	-	-	-	-	1	**1**
Total theses under way directed by C/I personnel	1	1	2	3	2	**3**
Total doctoral courses directed by C/I personnel	-	-	-	-	-	**-**
Total credits for doctoral courses	-	-	-	-	-	**-**
Total credits for postgraduate courses	-	-	-	-	0,2	**0,2**
Nº university associate professors	-	-	-	-	-	**-**

**** In competitive calls for grants***

GENETICS AND PLANT PRODUCTION

2.

Table 2.1. Human resources					
Responsible					
Lasa Dolhagaray, José Manuel					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total scientific staff personnel	**8**	**11**	**12**	**12**	**12**
Nº Research Professors	1	1	1	1	1
Nº Scientific Investigators	-	-	-	-	-
Nº Staff Research Scientists	7	10	10	10	10
Nº University Professors (joint C/I only)	-	-	-	-	-
Nº Associate Professors (joint C/I only)	-	-	-	-	-
Nº Other Univ. Professors in other categories (joint C/I only)	-	-	-	-	-
Nº "Investigadores Titulares"	-	-	1	1	1
Nº "Doctores vinculados"	-	-	-	-	-
Total contracted postdoctoral personnel	**2**	**1**	**-**	**-**	**-**
Nº Ramón y Cajal contracts	-	-	-	-	-
Nº I3P doctors	-	-	-	-	-
Other contracted doctors/postdoctoral fellowship	2	1	-	-	-
Total predoctoral personnel	**2**	**3**	**6**	**4**	**4**
Nº predoctoral FPI and FPU fellowships	-	1	3	3	3
Nº predoctoral I3P fellowships	-	-	-	-	-
Other contracted predoctorals/predoctoral fellows	2	2	3	1	1
Total civil service research support personnel	**7**	**8**	**7**	**7**	**8**
"Titulados Superiores" (University graduates)	1	1	-	-	-
"Titulados de grado medio"	3	3	3	3	3
Laboratory assistants	2	3	3	3	4
Research auxiliaries	1	1	1	1	1
Total research support personnel (permanent)	**4**	**4**	**4**	**4**	**4**
Total contracted research support personnel	**2**	**4**	**4**	**3**	**5**
Total general services personnel	**1**	**1**	**1**	**1**	**1**
Total support unit personnel	**-**	**-**	**-**	**-**	**-**

Table 2.2. Acquisition of equipment (more than 60,000 euros) in the last 5 years					
Responsible					
Lasa Dolhagaray, José Manuel					
Equipment	**Year of purchase**	**Purchase cost (euros)**	**Annual maintenance cost**	**Date end of useful life**	**Observations**
Invernadero	2002	168.540,57	3.000,00	2012	Gasoil: 6.000,00
Citómetro de flujo	2003	70.293,59	1.000,00	2010	
Sistema de análisis genético	2001	83.540,68	2.300,00	2011	
Red automatizada de riego	2001 - 2002	110.103,38	3.000,00	2026	

3.

Table 3.1. Competitive financing obtained						
Responsible						
Lasa Dolhagaray, José Manuel						
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000/4**
Nº National Plan projects	-	4	1	-	3	**8**
Nº PROFIT projects	-	-	-	-	-	**-**
Nº. FIS projects	-	-	-	-	-	**-**
Nº INIA projects	-	1	1	1	1	**4**
Nº projects/networks Framework R&D Programme	-	-	-	1	-	**1**
Nº regional government projects	2	-	1	-	1	**4**
Nº private foundation projects	-	-	-	-	-	**-**
Other competitive projects	-	-	-	1	-	**1**
Total Nº competitive projects	**2**	**5**	**3**	**3**	**5**	**18**
Nº of FTE involved in the approved projects	**2,50**	**10,50**	**13,50**	**4,00**	**15,50**	**46,00**
Financing (euros) National Plan projects	-	309.953,95	118.650,00	-	343.220,00	**771.823,95**
Financing (euros) PROFIT projects	-	-	-	-	-	**-**
Financing (euros) FIS projects	-	-	-	-	-	**-**
Financing (euros) INIA projects	-	83.204,12	32.932,00	141.385,80	50.714,08	**308.236,00**
Financing (euros) projects/networks Framework R&D Programme	-	-	-	20.000,00	-	**20.000,00**
Financing (euros) regional government projects	40.568,31	-	18.950,00	-	15.728,50	**75.246,81**
Financing (euros) private foundation projects	-	-	-	-	-	**-**
Financing (euros) other competitive projects	-	-	-	81.846,00	-	**81.846,00**
Total Financing (euros) competitive projects	**40.568,31**	**393.158,07**	**170.532,00**	**243.231,80**	**409.662,58**	**1.257.152,76**

Table 3.2.1. ISI-indexed scientific production						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total Nº articles in SCI/SSCI/A&HIS-indexed journals	**13**	**13**	**2**	**7**	**11**	**46**
List of up to 20 ISI-indexed journals most relevant to the Centre/Institute's activity and articles in them (indicate the nº of articles published in each)	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Journal of Irrigation and Drainage Engineering (0,413)	3	1	1	2	4	**11**
Agricultural Water Management (0,865)	2	-	1	3	3	**9**
Irrigation Science (0,996)	2	1	-	1	-	**4**
Theoretical and Applied Genetics (2,287)	-	-	-	-	3	**3**
Agronomy Journal (1,243)	1	1	-	-	-	**2**
HortScience (0,546)	-	1	-	-	1	**2**
International Journal of Development Biology (1,306)	-	2	-	-	-	**2**
Biology of the Cell (2,159)	-	1	-	-	-	**1**
Crop Science (0.828)	1	-	-	-	-	**1**
Euphytica (0,705)	1	-	-	-	-	**1**
Genetic Resources and Crop Evolution (0,573)	-	1	-	-	-	**1**
Genome (1,861)	-	1	-	-	-	**1**
Journal of Environmental Quality (1,682)	-	-	-	1	-	**1**
Journal of Experimental Botany (3,180)	-	1	-	-	-	**1**
Journal of Hydrology (1,354)	-	1	-	-	-	**1**
Plant Cell Reports (1,423)	-	1	-	-	-	**1**
Plant Physiology (5,634)	1	-	-	-	-	**1**
Soil Science Society of America Journal (1,524)	1	-	-	-	-	**1**
Weed Research (1,056)	1	-	-	-	-	**1**
Weed Science (1,230)	-	1	-	-	-	**1**

Table 3.2.2. Non-ISI scientific production						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº articles in international NON-ISI journals	2	1	-	-	-	**3**
Nº articles in national NON-ISI journals	2	2	3	1	4	**12**
Nº chapters in books/Collective works*	-	1	3	-	2	**6**
Nº collective works edited/directed*	-	-	-	-	-	**-**
Nº books	-	-	1	-	-	**1**

**** Collective works do not include meeting proceedings***

Table 3.2.3. Congresses and editorial activity						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total presentations at national congresses	**5**	**14**	**10**	**3**	**4**	**36**
Invited presentations at national congresses	1	1	-	1	-	**3**
Organizers/Members of scientific committees for national congresses	-	2	2	1	1	**6**
Total presentations at international congresses	**3**	**3**	**8**	**1**	**7**	**22**
Invited presentations at international congresses	1	-	1	1	3	**6**
Organizers/Members of scientific committees for international congresses	-	-	-	2	-	**2**
Editors/Directors of ISI journals	-	-	-	-	-	**-**
Editors/Directors of international non-ISI journals	-	-	-	-	-	**-**
Editors/Directors of national non-ISI journals	-	-	-	1	1	**2**
Board members of ISI journals	-	-	-	-	-	**-**
Board members of international non-ISI journals	1	1	2	2	2	**8**
Board members of national non-ISI journals	-	-	-	-	-	**-**

Table 3.2.4. Patents						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
NATIONAL patents applied for	3	-	-	1	-	**4**
NATIONAL patents obtained	3	-	1	-	-	**4**
EPO patents applied for	-	-	-	-	-	**-**
EPO patents obtained	-	-	-	-	-	**-**
PCT patents applied for	-	-	-	-	-	**-**
PCT patents obtained	-	-	-	-	-	**-**
USPTO patents applied for	-	-	-	-	-	**-**
USPTO patents obtained	-	-	-	-	-	**-**
Portfolio active national patents	4	4	5	5	5	**-**
Portfolio active patents EPO, USPTO, etc.	-	-	-	-	-	**-**

Table 3.2.5. Technology transfer						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Patents licensed to companies	-	-	-	2	2	**4**
Patentes in exploitation	3	3	3	3	3	**3**
Revenues of licensed/exploited patents	-	-	-	-	-	**-**
Start-ups initiated by Centre/Institute personnel	-	-	-	-	-	**-**
Nº persons del C/I related to Start-ups	-	-	-	-	-	**-**

Table 3.3.1. Contracts and services to companies						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	3	1	-	2	2	**8**
Revenues from R&D contracts	30.784,79	3.046,61	-	18.032,00	45.346,00	**97.209,40**
Nº de technological or advisory services	-	-	-	-	-	**-**
Revenues from service or advisory contracts	-	-	-	-	-	**-**

Table 3.3.2. Contracts and agreements with the public sector						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	-	1	1	1	2	**5**
Revenues from R&D contracts	-	6.010,11	3.004,75	8.996,40	23.999,90	**42.011,16**
Nº advisory services	-	-	-	-	-	**-**
Revenues from advisory contracts/agreements	-	-	-	-	-	**-**
Associated R&D units	-	-	-	-	-	**-**

Table 3.3.3 Assessment						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº ANEP coordinators/assistant	-	-	-	-	-	**-**
Nº managers/assistant PN	-	-	-	-	-	**-**
Nº National Plan selection commission members	-	1	1	-	-	**2**
Nº regional government selection commission members	-	1	1	-	-	**2**
Nº evaluations as HLG en EU	-	-	-	-	-	**-**
Other expert advisory committees	-	-	-	1	2	**3**

Table 3.3.4. Internationalization						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº projects/networks Framework R&D Programme	-	-	-	1	-	**1**
Nº projects in other European or international programs	-	-	-	-	-	**-**
Non-Spanish staff research personnel	-	-	-	-	-	**-**
Postdoctoral personnel contracted with non-Spanish funds	-	-	-	-	-	**-**
Foreign researchers on sabbatical and visiting professors (minimum 6 months)	-	-	-	-	-	**-**
Integrated actions and other bi(multi)lateral collaborations	-	-	-	-	-	**-**

Table 3.4. Formative activity						
Responsible						
Lasa Dolhagaray, José Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total predoctoral fellowships/contracts granted	**-**	**1**	**4**	**1**	**-**	**6**
Predoctoral FPI fellowships granted	-	1	2	1	-	**4**
Predoctoral FPU fellowships granted	-	-	-	-	-	**-**
Predoctoral Regional Government fellowships/contracts granted *	-	-	-	-	-	**-**
Predoctoral I3P fellowships	-	-	-	-	-	**-**
Postgraduate I3P fellowships	-	-	1	-	-	**1**
Other predoctoral fellowships/contracts granted*	-	-	1	-	-	**1**
Total stock predoctoral fellowships/contracts	**2**	**3**	**7**	**5**	**4**	**8**
Total predoctoral project fellowships/contracts granted (in equivalent/year)	-	-	-	-	-	**-**
Total postdoctoral fellowships/contracts	**2**	**-**	**-**	**-**	**-**	**2**
Total Ramon y Cajal contracts granted	-	-	-	-	-	**-**
Total Juan de la Cierva contracts	-	-	-	-	-	**-**
AC post-doctoral contracts granted*	-	-	-	-	-	**-**
Total Postdoctoral I3P doctor granted	-	-	-	-	-	**-**
Other postdoctoral fellowships/contracts granted*	2	-	-	-	-	**2**
Total stock postdoctoral contracts	**2**	**1**	**1**	**-**	**-**	**2**
Total postdoctoral project fellowships/contracts granted (in equivalent/year)	-	-	-	-	-	**-**
Total technical I3P contracts granted	-	2	1	-	-	**3**
Total MEC contracts for technical personnel	-	-	-	-	-	**-**
Other contracts for technical personnel	-	-	-	-	-	**-**
Total doctoral theses directed by C/I personnel	-	-	1	1	1	**3**
Total theses under way directed by C/I personnel	3	5	8	7	5	**9**
Total doctoral courses directed by C/I personnel	3,0	-	-	-	-	**3,0**
Total credits for doctoral courses	3,0	0,2	-	0,4	0,7	**4,3**
Total credits for postgraduate courses	3,4	5,9	4,1	3,9	1,2	**18,5**
Nº university associate professors	-	-	-	-	-	**-**

**** In competitive calls for grants***

PLANT NUTRITION

2.

Table 2.1. Human resources					
Responsible					
Becana Ausejo, Manuel					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total scientific staff personnel	**8**	**8**	**8**	**8**	**8**
Nº Research Professors	-	1	2	3	3
Nº Scientific Investigators	3	2	1	-	-
Nº Staff Research Scientists	5	5	5	5	5
Nº University Professors (joint C/I only)	-	-	-	-	-
Nº Associate Professors (joint C/I only)	-	-	-	-	-
Nº Other Univ. Professors in other categories (joint C/I only)	-	-	-	-	-
Nº "Investigadores Titulares"	-	-	-	-	-
Nº "Doctores vinculados"	-	-	-	-	-
Total contracted postdoctoral personnel	**4**	**3**	**4**	**3**	**4**
Nº Ramón y Cajal contracts	-	-	1	2	4
Nº I3P doctors	-	-	1	-	-
Other contracted doctors/postdoctoral fellowship	4	3	2	1	-
Total predoctoral personnel	**4**	**5**	**5**	**8**	**9**
Nº predoctoral FPI and FPU fellowships	1	2	2	4	4
Nº predoctoral I3P fellowships	-	-	1	1	1
Other contracted predoctorals/predoctoral fellows	3	3	2	3	4
Total civil service research support personnel	**7**	**6**	**7**	**7**	**7**
"Titulados Superiores" (University graduates)	-	-	-	-	-
"Titulados de grado medio"	2	2	3	3	3
Laboratory assistants	5	4	4	4	4
Research auxiliaries	-	-	-	-	-
Total research support personnel (permanent)	**1**	**1**	**1**	**1**	**1**
Total contracted research support personnel	**1**	**4**	**2**	**1**	**2**
Total general services personnel	**1**	**1**	**1**	**1**	**1**
Total support unit personnel	**-**	**-**	**-**	**-**	**-**

Table 2.2. Acquisition of equipment (more than 60,000 euros) in the last 5 years					
Responsible					
Becana Ausejo, Manuel					
Equipment	**Year of purchase**	**Purchase cost (euros)**	**Annual maintenance cost**	**Date end of useful life**	**Observations**
Equipo de cromatografía líquida de alta resolución con detector de masas	2002	283.677,71	10.000,00	2012	El coste de mantenimiento puede ser muy variable ya que no son costes fijos.
Sistema de lectura de microarrays de DNA	2003	62.242,00	3.000,00	2008	
PCR cuantitativo a tiempo real	2003	54.900,00	2.500,00	2008	

3.

Table 3.1. Competitive financing obtained						
Responsible						
Becana Ausejo, Manuel						
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000/4**
Nº National Plan projects	2	1	2	2	2	**9**
Nº PROFIT projects	-	-	-	-	-	**-**
Nº. FIS projects	-	-	-	-	-	**-**
Nº INIA projects	-	-	-	-	-	**-**
Nº projects/networks Framework R&D Programme	-	-	-	-	-	**-**
Nº regional government projects	-	3	2	1	5	**11**
Nº private foundation projects	-	-	-	-	-	**-**
Other competitive projects	-	1	-	1	1	**3**
Total Nº competitive projects	**2**	**5**	**4**	**4**	**6**	**23**
Nº of FTE involved in the approved projects	**3,50**	**6,50**	**19,00**	**7,50**	**26,00**	**62,50**
Financing (euros) National Plan projects	226.846,01	92.435,38	299.000,00	192.250,00	246.300,00	**1.056.831,39**
Financing (euros) PROFIT projects	-	-	-	-	-	**-**
Financing (euros) FIS projects	-	-	-	-	-	**-**
Financing (euros) INIA projects	-	-	-	-	-	**-**
Financing (euros) projects/networks Framework R&D Programme	-	-	-	-	-	**-**
Financing (euros) regional government projects	-	78.131,57	31.421,00	10.446,50	104.750,03	**224.749,10**
Financing (euros) private foundation projects	-	-	-	-	-	**-**
Financing (euros) other competitive projects	-	21.960,98	-	1.500,00	22.070,00	**45.530,98**
Total Financing (euros) competitive projects	**226.846,01**	**192.527,93**	**330.421,00**	**204.196,50**	**373.120,03**	**1.327.111,47**

Table 3.2.1. ISI-indexed scientific production						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total Nº articles in SCI/SSCI/A&HIS-indexed journals	**18**	**16**	**14**	**13**	**10**	**71**
List of up to 20 ISI-indexed journals most relevant to the Centre/Institute's activity and articles in them (indicate the nº of articles published in each)	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Journal of Plant Nutrition (0,430)	4	4	2	1	1	**12**
Plant Physiology (5,634)	5	1	1	2	-	**9**
Physiologia Plantarum (1,767)	2	1	2	-	2	**7**
Funtional Plant Biology (Australian J Plant Physiol.) (2,398)	1	1	3	-	-	**5**
Photosynthesis Research (2,239)	2	2	-	-	1	**5**
Molecular Plant-Microbe Interactions (3,580)	-	2	-	1	1	**4**
Plant and Soil (1,594)	-	-	2	-	2	**4**
Z.Naturforch (0,729)	2	-	2	-	-	**4**
Journal Physical Chemistry (3,679)	1	-	-	2	-	**3**
Tree Physiology (2,087)	-	1	2	-	-	**3**
European Journal Biochemistry (3,001)	1	-	-	1	-	**2**
Journal Luminescence (1,314)	-	-	-	-	2	**2**
Photochemical and Photobiological Sciences (1,359)	-	-	-	2	-	**2**
Plant Physiology and Biochemistry (1,729)	-	-	-	2	-	**2**
Planta (3,053)	-	1	-	-	1	**2**
Journal American Chemical Society (6,201)	-	-	-	1	-	**1**
Biochemistry_US (3,922)	-	1	-	-	-	**1**
Plant and Cell Physiology (3,159)	-	1	-	-	-	**1**
Journal of Experimental Botany (3,180)	-	1	-	-	-	**1**
Journal of Agriculture and Food Chemistry (2,102)	-	-	-	1	-	**1**

Table 3.2.2. Non-ISI scientific production						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº articles in international NON-ISI journals	2	-	2	-	4	**8**
Nº articles in national NON-ISI journals	5	3	7	10	2	**27**
Nº chapters in books/Collective works*	1	-	1	1	2	**5**
Nº collective works edited/directed*	-	-	-	-	-	**-**
Nº books	-	-	-	-	-	**-**

**** Collective works do not include meeting proceedings***

Table 3.2.3. Congresses and editorial activity						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total presentations at national congresses	**3**	**1**	**7**	**8**	**14**	**33**
Invited presentations at national congresses	-	-	2	2	3	**7**
Organizers/Members of scientific committees for national congresses	-	-	-	-	1	**1**
Total presentations at international congresses	**22**	**16**	**17**	**15**	**18**	**88**
Invited presentations at international congresses	2	3	1	5	7	**18**
Organizers/Members of scientific committees for international congresses	2	-	5	2	2	**11**
Editors/Directors of ISI journals	-	-	-	-	-	**-**
Editors/Directors of international non-ISI journals	-	-	-	-	-	**-**
Editors/Directors of national non-ISI journals	-	-	-	-	-	**-**
Board members of ISI journals	-	-	-	-	-	**-**
Board members of international non-ISI journals	-	-	-	-	-	**-**
Board members of national non-ISI journals	-	-	-	-	-	**-**

Table 3.2.4. Patents						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
NATIONAL patents applied for	2	1	-	-	-	**3**
NATIONAL patents obtained	-	-	-	1	1	**2**
EPO patents applied for	-	-	-	-	-	**-**
EPO patents obtained	-	-	-	-	-	**-**
PCT patents applied for	-	-	-	-	-	**-**
PCT patents obtained	-	-	-	-	-	**-**
USPTO patents applied for	-	-	-	-	-	**-**
USPTO patents obtained	-	-	-	-	-	**-**
Portfolio active national patents	-	-	-	1	2	**2**
Portfolio active patents EPO, USPTO, etc.	-	-	-	-	-	**-**

Table 3.2.5. Technology transfer						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Patents licensed to companies	-	-	-	-	-	**-**
Patentes in exploitation	-	-	-	-	-	**-**
Revenues of licensed/exploited patents	-	-	-	-	-	**-**
Start-ups initiated by Centre/Institute personnel	-	-	-	-	-	**-**
Nº persons del C/I related to Start-ups	-	-	-	-	-	**-**

Table 3.3.1. Contracts and services to companies						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	4	-	1	3	-	**8**
Revenues from R&D contracts	42.563,67	-	9.080,00	34.750,00	-	**86.393,67**
Nº de technological or advisory services	-	-	-	-	-	**-**
Revenues from service or advisory contracts	-	-	-	-	-	**-**

Table 3.3.2. Contracts and agreements with the public sector						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	-	-	-	1	1	**2**
Revenues from R&D contracts	-	-	-	2.100,00	5.950,00	**8.050,00**
Nº advisory services	-	-	-	-	-	**-**
Revenues from advisory contracts/agreements	-	-	-	-	-	**-**
Associated R&D units	-	-	-	-	-	**-**

Table 3.3.3 Assessment						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº ANEP coordinators/assistant	-	-	-	-	-	**-**
Nº managers/assistant PN	-	-	-	-	-	**-**
Nº National Plan selection commission members	-	-	-	4	-	**4**
Nº regional government selection commission members	-	-	-	-	-	**-**
Nº evaluations as HLG en EU	-	-	-	-	-	**-**
Other expert advisory committees	-	-	-	-	2	**2**

Table 3.3.4. Internationalization						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº projects/networks Framework R&D Programme	-	-	-	-	-	**-**
Nº projects in other European or international programs	1	1	1	1	1	**5**
Non-Spanish staff research personnel	-	-	-	-	-	**-**
Postdoctoral personnel contracted with non-Spanish funds	-	-	-	-	-	**-**
Foreign researchers on sabbatical and visiting professors (minimum 6 months)	1	1	-	-	-	**2**
Integrated actions and other bi(multi)lateral collaborations	3	-	-	2	3	**8**

Table 3.4. Formative activity						
Responsible						
Becana Ausejo, Manuel						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total predoctoral fellowships/contracts granted	**1**	**1**	**3**	**2**	**2**	**9**
Predoctoral FPI fellowships granted	1	1	-	2	1	**5**
Predoctoral FPU fellowships granted	-	-	-	-	-	**-**
Predoctoral Regional Government fellowships/contracts granted *	-	-	1	-	1	**2**
Predoctoral I3P fellowships	-	-	1	-	-	**1**
Postgraduate I3P fellowships	-	-	1	-	-	**1**
Other predoctoral fellowships/contracts granted*	-	-	-	-	-	**-**
Total stock predoctoral fellowships/contracts	**3**	**4**	**7**	**7**	**7**	**10**
Total predoctoral project fellowships/contracts granted (in equivalent/year)	0,66	1,25	0,08	0,92	1,92	**4,83**
Total postdoctoral fellowships/contracts	**2**	**3**	**2**	**1**	**2**	**10**
Total Ramon y Cajal contracts granted	-	-	1	1	2	**4**
Total Juan de la Cierva contracts	-	-	-	-	-	**-**
AC post-doctoral contracts granted*	-	2	-	-	-	**2**
Total Postdoctoral I3P doctor granted	-	-	1	-	-	**1**
Other postdoctoral fellowships/contracts granted*	2	1	-	-	-	**3**
Total stock postdoctoral contracts	**5**	**5**	**4**	**4**	**4**	**13**
Total postdoctoral project fellowships/contracts granted (in equivalent/year)	-	-	-	-	-	**-**
Total technical I3P contracts granted	-	1	-	-	1	**2**
Total MEC contracts for technical personnel	-	-	-	-	-	**-**
Other contracts for technical personnel	-	-	-	-	-	**-**
Total doctoral theses directed by C/I personnel	3	2	-	2	-	**7**
Total theses under way directed by C/I personnel	5	5	7	7	9	**12**
Total doctoral courses directed by C/I personnel	-	-	2,0	2,0	2,0	**6,0**
Total credits for doctoral courses	-	-	12,4	12,3	13,1	**37,8**
Total credits for postgraduate courses	-	-	-	0,4	-	**0,4**
Nº university associate professors	-	-	-	-	-	**-**

**** In competitive calls for grants***

POMOLOGY

2.

Table 2.1. Human resources					
Responsible					
Moreno Sánchez, Mª. Angeles					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total scientific staff personnel	**4**	**4**	**7**	**7**	**7**
Nº Research Professors	-	-	-	-	-
Nº Scientific Investigators	1	1	2	2	2
Nº Staff Research Scientists	3	3	4	4	4
Nº University Professors (joint C/I only)	-	-	-	-	-
Nº Associate Professors (joint C/I only)	-	-	-	-	-
Nº Other Univ. Professors in other categories (joint C/I only)	-	-	-	-	-
Nº "Investigadores Titulares"	-	-	1	1	1
Nº "Doctores vinculados"	-	-	-	-	-
Total contracted postdoctoral personnel	**-**	**1**	**-**	**-**	**1**
Nº Ramón y Cajal contracts	-	1	-	-	-
Nº I3P doctors	-	-	-	-	-
Other contracted doctors/postdoctoral fellowship	-	-	-	-	1
Total predoctoral personnel	**2**	**2**	**5**	**4**	**4**
Nº predoctoral FPI and FPU fellowships	-	-	-	-	1
Nº predoctoral I3P fellowships	-	-	1	1	1
Other contracted predoctorals/predoctoral fellows	2	2	4	3	2
Total civil service research support personnel	**5**	**5**	**4**	**4**	**3**
"Titulados Superiores" (University graduates)	1	1	-	-	-
"Titulados de grado medio"	2	2	2	2	2
Laboratory assistants	1	1	1	1	1
Research auxiliaries	1	1	1	1	-
Total research support personnel (permanent)	**1**	**-**	**-**	**-**	**-**
Total contracted research support personnel	**2**	**1**	**3**	**3**	**4**
Total general services personnel	**1**	**1**	**1**	**1**	**1**
Total support unit personnel	**-**	**-**	**-**	**-**	**-**

Table 2.2. Acquisition of equipment (more than 60,000 euros) in the last 5 years					
Responsible					
Moreno Sánchez, Mª. Angeles					
Equipment	**Year of purchase**	**Purchase cost (euros)**	**Annual maintenance cost**	**Date end of useful life**	**Observations**

3.

Table 3.1. Competitive financing obtained						
Responsible						
Moreno Sánchez, Mª. Angeles						
Year	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000/4**
Nº National Plan projects	-	3	2	1	-	**6**
Nº PROFIT projects	-	-	-	-	-	**-**
Nº. FIS projects	-	-	-	-	-	**-**
Nº INIA projects	-	2	1	-	1	**4**
Nº projects/networks Framework R&D Programme	-	-	-	-	-	**-**
Nº regional government projects	-	1	1	1	2	**5**
Nº private foundation projects	-	-	-	-	-	**-**
Other competitive projects	-	-	1	-	-	**1**
Total Nº competitive projects	**-**	**6**	**5**	**2**	**3**	**16**
Nº of FTE involved in the approved projects	**-**	**7,00**	**7,50**	**9,00**	**11,00**	**34,50**
Financing (euros) National Plan projects	-	144.176,79	172.270,00	225.100,00	-	**541.546,79**
Financing (euros) PROFIT projects	-	-	-	-	-	**-**
Financing (euros) FIS projects	-	-	-	-	-	**-**
Financing (euros) INIA projects	-	55.998,10	36.916,00	-	21.458,00	**114.372,10**
Financing (euros) projects/networks Framework R&D Programme	-	-	-	-	-	**-**
Financing (euros) regional government projects	-	24.040,48	24.056,00	5.481,79	22.707,38	**76.285,65**
Financing (euros) private foundation projects	-	-	-	-	-	**-**
Financing (euros) other competitive projects	-	-	53.057,34	-	-	**53.057,34**
Total Financing (euros) competitive projects	**-**	**224.215,37**	**286.299,34**	**230.581,79**	**44.165,38**	**785.261,88**

Table 3.2.1. ISI-indexed scientific production						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total Nº articles in SCI/SSCI/A&HIS-indexed journals	**-**	**5**	**7**	**4**	**6**	**22**
List of up to 20 ISI-indexed journals most relevant to the Centre/Institute's activity and articles in them (indicate the nº of articles published in each)	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Journal of Plant Nutrition (0,430)	-	-	2	-	2	**4**
Scientia Horticulturae (0,540)	-	-	1	-	2	**3**
American Journal Botany (2,337)	-	-	-	1	1	**2**
Australian Journal of Plant Physiology (2,398)	-	1	-	-	-	**1**
Euphytica (0,705)	-	-	1	-	-	**1**
Functional Plant Biology (1,747)	-	-	1	-	-	**1**
J Amer Soc Hortic Sci (1,033)	-	-	-	1	-	**1**
Journal of Applied Botany (0,600)	-	-	1	-	-	**1**
Journal of Horticultural Science and Biotechnology (0,546)	-	1	-	-	-	**1**
Phylosophical trans. Royal Society Biological Sci (2.449)	-	-	-	1	-	**1**
Physiologia Plantarum (1,767)	-	1	-	-	-	**1**
Plant and Cell Physiology (3,159)	-	1	-	-	-	**1**
Plant Cell Environment (3,613)	-	-	-	1	-	**1**
Plant Science (1,652)	-	-	-	-	1	**1**
Scientia Horticulturae (0,540)	-	-	1	-	-	**1**
Tree Physiology (2,087)	-	1	-	-	-	**1**

Table 3.2.2. Non-ISI scientific production						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº articles in international NON-ISI journals	2	1	1	3	7	**14**
Nº articles in national NON-ISI journals	6	7	9	9	5	**36**
Nº chapters in books/Collective works*	-	2	-	1	-	**3**
Nº collective works edited/directed*	-	-	-	-	-	**-**
Nº books	-	-	-	-	-	**-**

**** Collective works do not include meeting proceedings***

Table 3.2.3. Congresses and editorial activity						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total presentations at national congresses	**5**	**8**	**8**	**14**	**3**	**38**
Invited presentations at national congresses	-	-	1	-	-	**1**
Organizers/Members of scientific committees for national congresses	-	-	-	-	-	**-**
Total presentations at international congresses	**2**	**12**	**20**	**5**	**7**	**46**
Invited presentations at international congresses	-	-	1	1	1	**3**
Organizers/Members of scientific committees for international congresses	-	-	2	1	-	**3**
Editors/Directors of ISI journals	-	-	-	-	-	**-**
Editors/Directors of international non-ISI journals	-	-	-	-	-	**-**
Editors/Directors of national non-ISI journals	1	1	1	2	2	**7**
Board members of ISI journals	-	-	-	-	-	**-**
Board members of international non-ISI journals	-	-	-	-	-	**-**
Board members of national non-ISI journals	2	2	3	2	2	**11**

Table 3.2.4. Patents						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
NATIONAL patents applied for	-	-	-	-	-	**-**
NATIONAL patents obtained	-	-	-	1	1	**2**
EPO patents applied for	-	-	-	-	-	**-**
EPO patents obtained	-	-	3	-	-	**3**
PCT patents applied for	-	-	-	-	-	**-**
PCT patents obtained	-	-	-	-	-	**-**
USPTO patents applied for	-	-	-	-	-	**-**
USPTO patents obtained	-	-	-	-	-	**-**
Portfolio active national patents	1	1	1	2	3	**3**
Portfolio active patents EPO, USPTO, etc.	-	-	3	3	3	**3**

Table 3.2.5. Technology transfer						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Patents licensed to companies	-	2	2	2	2	**8**
Patentes in exploitation	-	2	2	2	2	**8**
Revenues of licensed/exploited patents	-	-	3.606,07	4.223,72	4.252,28	**12.082,07**
Start-ups initiated by Centre/Institute personnel	-	-	-	-	-	**-**
Nº persons del C/I related to Start-ups	-	-	-	-	-	**-**

Table 3.3.1. Contracts and services to companies						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	2	-	2	-	2	**6**
Revenues from R&D contracts	901,52	901,52	57.931,88	901,52	30.301,52	**90.937,96**
Nº de technological or advisory services	-	-	-	-	-	**-**
Revenues from service or advisory contracts	-	-	-	-	-	**-**

Table 3.3.2. Contracts and agreements with the public sector						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº R&D contracts/agreements	1	1	-	1	-	**3**
Revenues from R&D contracts	13.823,28	13.823,28	-	48.999,04	-	**76.645,60**
Nº advisory services	-	-	-	-	-	**-**
Revenues from advisory contracts/agreements	-	-	-	-	-	**-**

Table 3.3.3 Assessment						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº ANEP coordinators/assistant	-	-	-	-	-	**-**
Nº managers/assistant PN	-	-	-	-	-	**-**
Nº National Plan selection commission members	-	-	1	-	-	**1**
Nº regional government selection commission members	-	-	-	-	-	**-**
Nº evaluations as HLG en EU	-	-	-	-	-	**-**
Other expert advisory committees	-	-	1	-	-	**1**

Table 3.3.4. Internationalization						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Nº projects/networks Framework R&D Programme	-	-	-	-	-	**-**
Nº projects in other European or international programs	-	-	-	-	1	**1**
Non-Spanish staff research personnel	-	-	-	-	-	**-**
Postdoctoral personnel contracted with non-Spanish funds	-	-	-	-	-	**-**
Foreign researchers on sabbatical and visiting professors (minimum 6 months)	-	1	1	-	-	**2**
Integrated actions and other bi(multi)lateral collaborations	-	-	-	3	2	**5**

Table 3.4. Formative activity						
Responsible						
Moreno Sánchez, Mª. Angeles						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total predoctoral fellowships/contracts granted	**1**	**-**	**3**	**-**	**1**	**5**
Predoctoral FPI fellowships granted	-	-	-	-	1	**1**
Predoctoral FPU fellowships granted	-	-	-	-	-	**-**
Predoctoral Regional Government fellowships/contracts granted *	-	-	-	-	-	**-**
Predoctoral I3P fellowships	-	-	1	-	-	**1**
Postgraduate I3P fellowships	-	-	-	-	-	**-**
Other predoctoral fellowships/contracts granted*	1	-	2	-	-	**3**
Total stock predoctoral fellowships/contracts	**2**	**2**	**5**	**4**	**4**	**6**
Total predoctoral project fellowships/contracts granted (in equivalent/year)	**-**	**-**	**-**	**-**	**-**	**-**
Total postdoctoral fellowships/contracts	**-**	**1**	**-**	**-**	**-**	**1**
Total Ramon y Cajal contracts granted	-	1	-	-	-	**1**
Total Juan de la Cierva contracts	-	-	-	-	-	**-**
AC post-doctoral contracts granted*	-	-	-	-	-	**-**
Total Postdoctoral I3P doctor granted	-	-	-	-	-	**-**
Other postdoctoral fellowships/contracts granted*	-	-	-	-	-	**-**
Total stock postdoctoral contracts	**-**	**1**	**-**	**-**	**-**	**1**
Total postdoctoral project fellowships/contracts granted (in equivalent/year)	**-**	**-**	**-**	**-**	**0,58**	**0,58**
Total technical I3P contracts granted	**-**	**-**	**1**	**-**	**1**	**2**
Total MEC contracts for technical personnel	**-**	**-**	**-**	**-**	**-**	**-**
Other contracts for technical personnel	**-**	**-**	**-**	**-**	**-**	**-**
Total doctoral theses directed by C/I personnel	-	-	-	4	-	**4**
Total theses under way directed by C/I personnel	3	3	6	5	6	**10**
Total doctoral courses directed by C/I personnel	-	-	-	1,0	1,0	**2,0**
Total credits for doctoral courses	-	-	-	2,4	2,4	**4,8**
Total credits for postgraduate courses	-	-	0,4	0,9	0,4	**1,7**
Nº university associate professors	-	1	1	1	1	**4**

**** In competitive calls for grants***

UNITS AND SERVICES

2.

Table 2.1. Human resources					
Responsible					
Igartua Arregui, Ernesto					
Years	**2000**	**2001**	**2002**	**2003**	**2004**
Total scientific staff personnel	**-**	**-**	**-**	**-**	**-**
Nº Research Professors	-	-	-	-	-
Nº Scientific Investigators	-	-	-	-	-
Nº Staff Research Scientists	-	-	-	-	-
Nº University Professors (joint C/I only)	-	-	-	-	-
Nº Associate Professors (joint C/I only)	-	-	-	-	-
Nº Other Univ. Professors in other categories (joint C/I only)	-	-	-	-	-
Nº "Investigadores Titulares"	-	-	-	-	-
Nº "Doctores vinculados"	-	-	-	-	-
Total contracted postdoctoral personnel	**-**	**-**	**-**	**-**	**-**
Nº Ramón y Cajal contracts	-	-	-	-	-
Nº I3P doctors	-	-	-	-	-
Other contracted doctors/postdoctoral fellowship	-	-	-	-	-
Total predoctoral personnel	**-**	**-**	**-**	**-**	**-**
Nº predoctoral FPI and FPU fellowships	-	-	-	-	-
Nº predoctoral I3P fellowships	-	-	-	-	-
Other contracted predoctorals/predoctoral fellows	-	-	-	-	-
Total civil service research support personnel	**1**	**1**	**1**	**1**	**1**
"Titulados Superiores" (University graduates)	-	-	-	-	-
"Titulados de grado medio"	-	-	-	-	-
Laboratory assistants	1	1	1	1	1
Research auxiliaries	-	-	-	-	-
Total research support personnel (permanent)	**-**	**-**	**-**	**-**	**-**
Total contracted research support personnel	**-**	**-**	**-**	**-**	**-**
Total general services personnel	**18**	**20**	**20**	**19**	**20**
Total support unit personnel	**11**	**10**	**10**	**10**	**10**

3.

Table 3.4. Formative activity						
Responsible						
Igartua Arregui, Ernesto						
Years	**2000**	**2001**	**2002**	**2003**	**2004**	**Total 2000-4**
Total predoctoral fellowships/contracts granted	**-**	**-**	**-**	**-**	**-**	**-**
Predoctoral FPI fellowships granted	-	-	-	-	-	-
Predoctoral FPU fellowships granted	-	-	-	-	-	-
Predoctoral Regional Government fellowships/contracts granted *	-	-	-	-	-	-
Predoctoral I3P fellowships	-	-	-	-	-	-
Postgraduate I3P fellowships	-	-	-	-	-	-
Other predoctoral fellowships/contracts granted*	-	-	-	-	-	-
Total stock predoctoral fellowships/contracts	-	-	-	-	-	-
Total predoctoral project fellowships/contracts granted (in equivalent/year)	-	-	-	-	-	-
Total postdoctoral fellowships/contracts	**-**	**-**	**-**	**-**	**-**	**-**
Total Ramon y Cajal contracts granted	-	-	-	-	-	-
Total Juan de la Cierva contracts	-	-	-	-	-	-
AC post-doctoral contracts granted*	-	-	-	-	-	-
Total Postdoctoral I3P doctor granted	-	-	-	-	-	-
Other postdoctoral fellowships/contracts granted*	-	-	-	-	-	-
Total stock postdoctoral contracts	**-**	**-**	**-**	**-**	**-**	**-**
Total postdoctoral project fellowships/contracts granted (in equivalent/year)	**-**	**-**	**-**	**-**	**-**	**-**
Total technical I3P contracts granted	**-**	**1**	**-**	**-**	**-**	**1**
Total MEC contracts for technical personnel	**-**	**-**	**-**	**-**	**-**	**-**
Other contracts for technical personnel	**-**	**-**	**-**	**-**	**-**	**-**
Total doctoral theses directed by C/I personnel	-	-	-	-	-	-
Total theses under way directed by C/I personnel	-	-	-	-	-	-
Total doctoral courses directed by C/I personnel	-	-	-	-	-	-
Total credits for doctoral courses	-	-	-	-	-	-
Total credits for postgraduate courses	-	-	-	-	-	-
Nº university associate professors	-	-	-	-	-	-

In competitive calls for grants