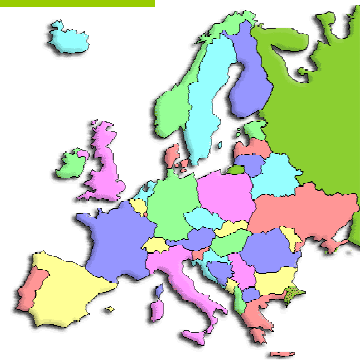


# Industrial biotechnology in Spain

Round Table on industrial  
biotechnology in Slovenia  
Ljubljana on 21 May, 2008



**D1.** Dear ....., Ladies & Gentlemen,

First of all, I would like to thank you for the hospitality and generosity with which I am being welcomed.

I would also like to thank Europabio organization and National Institute of Chemistry for providing me with the opportunity to introduce my country, Spain, and its role as a member of the international community.

Let me please, **mention some key points**, about Spain Biotech in order to go deeper into IB in our country, ending with the kind of activities are developed in ASEBIO.

## **About Spanish biotech in a few words.....**

- **Spanish Biotech sector**
- **IB Companies**
- **Some actions...**  
**...and some ideas...**

...And because Spain is supporting the bio-based economy



### **Private sector Service companies based in Spain**

- **Consultancy firms for biotechnology sector**
- **Intellectual property agencies**
- **Other service companies: packaging and production equipment, manufacturing, marketing and publicity agencies, fine chemical suppliers, warehousing and distribution, specialist recruitment, training, etc.**

# Who are we?



## ASEBIO is the Spanish Association of Bioenterprises

- ASEBIO brings together companies, associations, foundations, universities, technology and research centres that undertake activities either directly or indirectly related to biotechnology in Spain.
- ASEBIO has been the biotechnology sector platform since 1999, bringing the sector together and representing its members' interests before regional, national and European governments.
- ASEBIO belongs to and receives support from EUROPABIO, the European Association of Bioindustries and it is a member of the CEOE (The Spanish Confederation of Business Organisations)

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## About Spanish biotech in a few words.....

- Spanish Biotech sector
- IB Companies
- Some actions...  
...and some ideas...

## What?

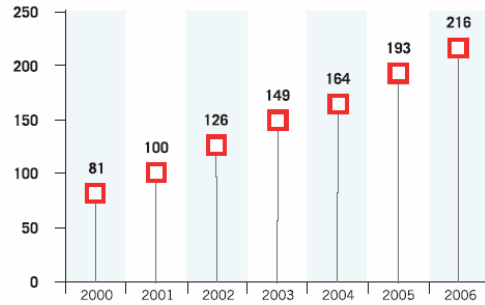
In 2007, **>200 companies** were totally dedicated to biotech in Spain, with revenues surpassing 500M€. Those are the companies that form the core of the sector and are the main engine in terms of generating knowledge. They employ over 3,000 people

In addition, there were **> 500 partially dedicated companies** with revenues close to 20.000 M €

For both groups of firms, annual growth in invoicing, employee numbers and R&D spending **approached 20%.**

# What?

Spain's biotech sector has grown substantially in the past

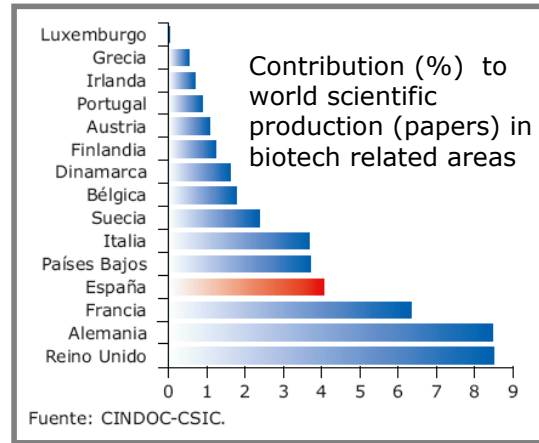


Source: ASEBIO

- The **total number** of companies dedicated to biotech has almost **tripled since the year 2000**

# Why?

High standards of scientific production, and changes in both cultural and regulatory environment are main drivers for an emergent, but promising, biotech sector

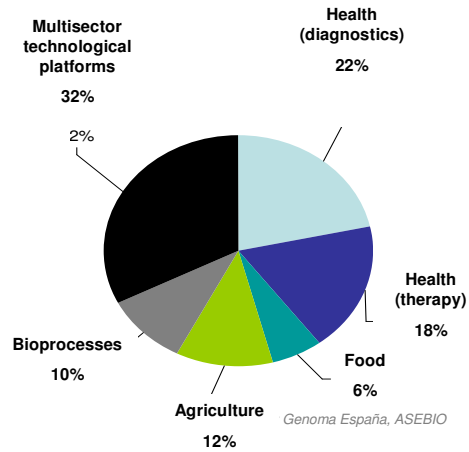


## Spanish biotechnology – features

### Which one?

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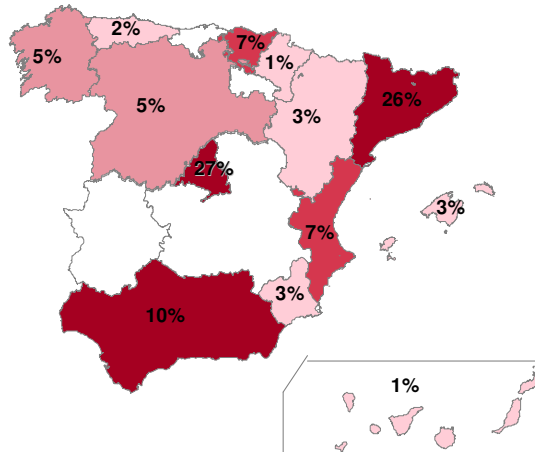
- **Red biotech** (healthcare) is Spain's most important biotech sector, accounting for **more than 40% of the activity**
- Several companies stand out, with **important advances in clinical development** for various treatments
- **Green** (agro-feeding) **biotech** is the **second most important** sector, accounting for a combined 18% of the industry
- **Industrial biotechnology has also seen an important boom** in Spain since 2005, covering various activities like bioenergy, biorremediation, biomaterials and bioprocesses
- There are a large number of companies that offer technological platforms with applications in several fields (23.6%), like genomics and proteomics.



You also can see in the graphic that IB represents near by 10 % in Spain

# Where?

Spain's biotech landscape (% of companies by region)



Source: ASEBIO

- Spain's biotech industry is **centered around three main regions:**
  - Madrid
  - Catalonia
  - Andalusia
- The **Basque region** and **Valencia** are emerging as other important biotech regions, hosting now **> 80 biotech companies**
- Other regions such as **Galicia** and **Castilla-León** are also gaining importance thanks to strong local and regional **support and subsidies**

**Most of the companies operating in the sector are concentrated in Madrid and in Catalonia.**  
**There are other emergent centres such as Andalusia, the Basque Country and Valencia.**

# How?





Most companies totally dedicated to biotechnology have their origin in the public system of R&D (spin-offs)

However the biggest firms are those spun out from consolidated industrial groups. This phenomenon has been essential for the growth of the Spanish sector and is the origin of a large number of the more veteran biotechnological companies (Pharmamar, Natraceutical, Puleva Biotech)

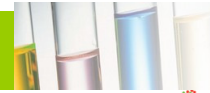


# Biotechnology and its subsectors

- Biotechnology uses living processes for industrial applications
- It is an horizontal sector with multiple applications that impact ≈ 30% of GDP in developed countries (OCDE)

	White biotech	Green biotech	Red biotech	Other
Sector	Industry	Food/agriculture	Health	Technologies
% companies (Spain)	6	20	50	24
Products	<ul style="list-style-type: none"> <li>• Detergents</li> <li>• Refinement, purification</li> <li>• Biofuels</li> <li>• Bioplastics</li> <li>• Textile treatments</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Transgenic crops                             <ul style="list-style-type: none"> <li>- Plague resistant</li> <li>- Improved</li> <li>- Adapted</li> </ul> </li> <li>• Improved foods</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Biological medicines</li> <li>• Diagnostics</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Devices                             <ul style="list-style-type: none"> <li>- Biosensors</li> <li>- Genomics</li> <li>- Proteomics</li> </ul> </li> <li>• Large-scale production</li> <li>• Etc.</li> </ul>
				

# Actions in IB in Spain

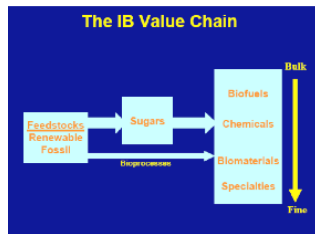


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Spain is not a mere spectator of the events, a consumer of biotechnology. Spain has become an active agent and even leader in some of these challenges of future. At the same time, we work so that our woven business can participate in the global competition by capturing the value of the biotechnology.

## Innovation

### **Public research funding / Research Programme**



**Member of ERA-net IB:** MEC – Spanish ministry of education and science / FECyT - Fundación Española de Ciencia y Tecnología

Biotechnology has been identified as an strategic action in the Spanish National plan for R&D. The budget of the national plan 2008-2011 is 1.581,54 M€.

That means that call for proposals will be opened for many of the instrument of that plan.

# Actions in IB in Spain

## Innovation



### Pilot plants

#### **BIOPOLIS, S.L.**

**Reactor type:** Fermenters of 2, 5, 15, 30, 75 y 300 L of capacity, with "in situ" sterilization and control software  
**Process developed:** Development optimization of fermentative processes. Optimization of recovery processes for biomass and microbial products. Standardized production of batches according to established procedures  
**Capacity:** Production of microorganisms by fermentation up to volumes of 300 l.  
**Funding:** Public-private co-funding. Open to customers



#### **GAIKER Technological Centre**

**Reactor type:** Fermenter.  
**Process developed:** Optimisation of enzymatic reactions for maximum yield, scaling-up, support in industrial applications of the system.  
**Capacity:** 30 L  
**Funding:** Private (non-lucrative consortium of private companies). Open to customers



#### **PEVESA**

**Reactor type:** Multi-purpose, versatile.  
**Process developed:** Production of peptides and amino acids from vegetal origin. Design for product development and market introduction studies  
**Capacity:** 100 litres  
**Funding:** Private



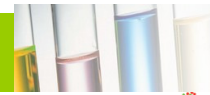
#### **BIOT**

**Reactor type:** Biofermentors and bioreactors  
**Process developed:** Fermentations and bioprocesses in general (Synthesis of functional foods, production of bioalcohol, biogas, bioplastics).  
**Capacity:** 50, 100 and 300 L. (now in processes of expanding up to 1000 L).  
**Funding:** Private. Open to customers



# Actions in IB in Spain

## Innovation



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### Pilot plants

#### **Fermentation pilot plant. Chemical Engineering Department. Autonomous University of Barcelona**

**Reactor type:** Biostat UD50 pilot scale bioreactor, 300L pilot scale bioreactor (B.Braun), Stirred tank with cooling system. Pressure and storage tanks.

**Process developed:** Development of continuous, batch or fed-batch processes with microorganisms either bacterium, fungi or yeast, genetically modified or not. Development of products obtained from cultures. Primary downstream stages.

**Capacity:** Up to 300 L.

**Funding:** Public, open to customers.



#### **Marine Biotech Centre. Las Palmas de Gran Canaria University**

**Reactor type:** Vertical tubular photobioreactors. Stirred raceways (8m<sup>2</sup> and 30 m<sup>2</sup>)

**Process developed:** Isolation, identification and maintenance of germoplasm banks. Cultivation, production and industrial evaluation of microalgae and cyanobacteria. Design and validation of photobioreactors for microalgae. Selection and conservation of algae strains.

**Capacity:** Up to 500 L.

**Funding:** Public, open to customers



#### **CIEMAT**

**Reactor type:** Steam explosion reactor

**Process developed:** lignocellulosic biomass fractionation.

**Funding:** Public



#### **Alcalá Univ.- Pilot plant of Fine Chemistry**

**Reactor type:** Calorimetric reactors (1L at 6 bar and 2L at atmospheric pressure) Reactors of glass and stainless steel (5L) Biofermenters (2 to 40L).

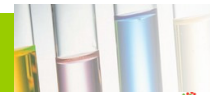
**Process developed:** Diverse fermentative processes, enzymatic reactions, design of residual water treatments, design of biopolymers.

**Capacity:** Up to 40L.

**Funding:** Public, open to customers and associated companies.

# Actions in IB in Spain

## Innovation



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### Demonstration projects

#### Canarias Technological Institute

**Kind of project:** Biomass production and treatment for food industry.

**Process developed:** Cultivation and processing of microalgae for biomass production. Downstream processing of biomass for food production. Process optimisation.

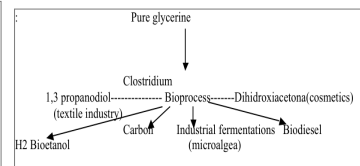
**Capacity:** 1200 m<sup>2</sup> surface of open tanks. Production of 6 tonnes of dry biomass per year.

**Funding:** Public. Plant exploitation is offered as service for companies



#### NEURON BPh: making opportunities from the problems

The tremendous growth of the biofuel industry has resulted in an oversupply of crude glycerol and a 10-fold decrease in prices over the past two years. At current prices glycerol is a very competitive raw substrate to produce added value products (chemicals, polymers and oils) via microbial fermentation. NEURON BPh is currently intent on developing these processes for different industrial applications.



biotech revaluation of the pure glycerin

# Actions in IB in Spain



## Policy

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### ***Policies & regulations***

No national regulatory or political restraints regarding introduction of biobased products.

### ***Public procurement programmes for biobased products***

Green procurement exclusively applies to public authorities. Specific national action plan currently not an issue in government administration.

# Actions in IB in Spain



## We also know the impact of the IB and its potential:

(Reduction of environmental damage and cost reduction in most of the cases)

## And We propose

- More governmental support for industrial biotechnology
- Emphasizing the multidisciplinary character of the Industrial Biotechnology...
- Stimulating the participation of the SMEs
- Identify emerging technologies and barriers against diffusion
- Action to overcome barriers, framework conditions



## We support policy measures by Europabio and stakeholders' Technology Platform to build a strategic alliance for IB:

- Benchmark Europe with other OECD countries on development of bio-based economy
- Create European IB vision and roadmap
- Create financial incentives and supportive regulatory framework
- Encourage competitive biological feed-stock prices
- Build public awareness and support

# Actions in IB in Spain



From a **business perspective**, the main objectives for R&D in the industrial biotechnology are:

Discovery and optimization of stumps and bio catalysers  
Development and production of products and new processes and in a way efficient innovators since the points of view of the price and of the ecology • to Make use of renewable commodity as additional sources

- Pharmaceuticals
- Bulk Chemicals/Fine Chemicals
- Textiles and Leather
- Pulp and Paper
- Food and
- Relevant Sectors

# How?

## WORK GROUPS: THE DRIVING FORCE OF ASEBIO



### INDUSTRIAL BIOTECHNOLOGY

#### Mission:

Its comprising companies undertake the following activities, among others: Bioenergy, Bioremediation, Biomaterials, Industrial Bioprocesses, etc. The Group was born with the desire to foster the introduction of sustainable bioprocesses in a variety of industrial sectors and to act as ASEBIO's interlocutor in the Spanish Platform for Sustainable Chemistry.

#### Latest Activities:

- Co-founder of the Spanish Platform for Sustainable Chemistry
- Co-ordination of a project to foster the use of biotechnology in traditional industrial sectors, under the framework of the Plan for SME Consolidation and Competitiveness.

Following its homologous European Platform ([SUSCHEM](#)), the Spanish Platform has been established as a response to the growing need of the chemical industry to increase and assure its competitiveness on the long run, based on global and strategic R&D and innovative actions



## How?

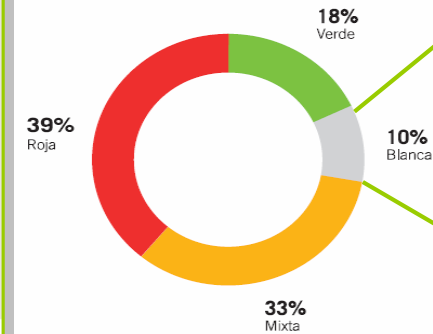


At present, ASEBIO is developing the INNOEMPRESA project, with the support of the MITYC, whose main objective is to improve the incorporation of biotech innovations in Spanish SMEs of diverse traditional sectors (Food, chemical, pharmaceutical, cosmetic, textile, paper, etc.)

ASEBIO has created the Unit of International Innovation (UII), financed jointly by CDTI. This new office, is improving the participation of the Spanish biotech sector in the VII FM and will allow to attend and to assess in the formation of the consortiums, quality proposals preparation and negotiation with the European Commission to maximize the European financing obtained in the R&D projects.

Biotech sector will be able to improve their participation by “Biotech Partner Finder” (online research tool for offer and demand of biotech resources in Spain)

# Industrial Biotech companies based in Spain



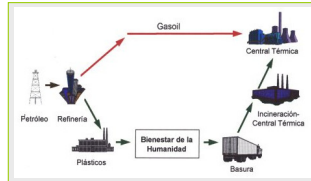
- AB LABORATORIOS
- ADVANCELL
- ARTBIOCHEM
- ASTERIA BIOTECH
- BIOAURUM
- BIONATURIS
- BIOMEDAL
- BIONOSTRA
- BIOPOLIS
- BIOTBIOTECH PROJECTS
- BIOTOOLS
- BIOREPLY
- CALANTIA BIOTECH
- CELLERIX
- CSIC
- ERA7
- FUNDACIÓN PARQUE CIENTÍFICO AULA DEI
- GAIKER
- GRIFOLS
- IMBIOSIS
- INGENASA
- IUCT
- LAIMAT SOLUCIONES CIENTÍFICAS TÉCNICAS, S.L.
- NEURON BIOPHARMA
- NEWBIOTECHNIC
- OPERON
- PCM
- PEVESA
- SISTEMAS GENOMICOS
- ZELTIA

## 2. Posibilidades de aplicación en empresas de los materiales



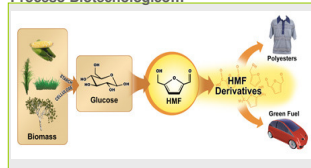
**OBTENCIÓN DE BIOPOLÍMEROS:** La humanidad ha utilizado siempre polímeros naturales, hasta que en el siglo XX empezaron a aparecer los derivados del petróleo, materia prima limitada y escasa. La Biotecnología aporta una solución con la aparición de los Biopolímeros

### Proceso Químico...



- Empleo de grandes cantidades de combustible fósil, el cual es limitado
- Gran gasto energético en su fabricación
- Progresivo encarecimiento por el aumento en el precio de la materia prima

### Proceso Biotecnológico...



- Disminución, aproximadamente un 35%, del combustible fósil necesario
- Menores residuos
- Su producción no se basa en una materia prima limitada
- Aparición progresiva de un mayor número de nichos de impacto

## Whose?



- Most companies are still majority owned by their founders although many have received expansion capital (less than 2 €M) from small venture capital funds.
- Venture capital (like biotechnology) is trying to overcome an historical delay in Spain. This could change in the mid-term due to some new initiatives (both public and private).
- Moreover, in Spain the possibility of trading on the stock exchange is close to zero, eliminating a fundamental funding source for biotechnology companies and limiting the participation of pre-IPO venture capital.

## Investment opportunities



- Solid bio fuel value chain (pellets, chips, bricks etc)
- Liquid bio fuel value chain (bio diesel, bio ethanol)
- Ecological Agriculture
- Functional food.
- Venture capital.
- Generics
- Nano-medicine
- Food safety
- Gene silencing (RNAi)
- Industrial enzymes using transgenic plants
- Therapeutic proteins using non-genetically modified plants.
- Medicines from pharmacological target.
- Bio-chip. Personalized medicine.
- Genetic bio-markers
- Molecular diagnosis and arrays of DNA and proteins.
- Active ingredients of algae.
- Bio-IT (Information Technology).

SEE YOU IN BIOSPAIN 2008!!!!  
17-19 SEPT IN GRANADA (SPAIN)



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The support received from academics and professionals, public and private institutions and the joint work of national and international bodies, augur excellent results for a convention which, edition after edition, is ever more consolidated as an essential event to attend in this sector in Europe.

**TOWARDS A *sustainable* bioeconomy**

**4<sup>th</sup> INTERNATIONAL meeting on biotechnology**

GRANADA  
Exhibition and Congress Centre 17/19 September 08

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www.biospain2008.org

- SCIENCE through the BIOTEC 2008 congress
- POLITICS & SOCIETY thanks to a full Plenary Session programme
- FINANCE through attracting capital in the Investors' Forum
- BUSINESS DEVELOPMENT through the Partnering event, and
- TRADE PROMOTION mirrored in the Trade Show

**THANK YOU!!**  
**Looking forward to working with you**

*For further information please contact:*

**Isabel García**  
**Project Co-ordinator-ASEBIO**  
**[igarcia@asebio.com](mailto:igarcia@asebio.com)**



**[www.asebio.com](http://www.asebio.com)**