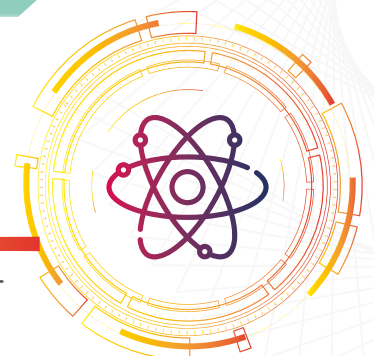
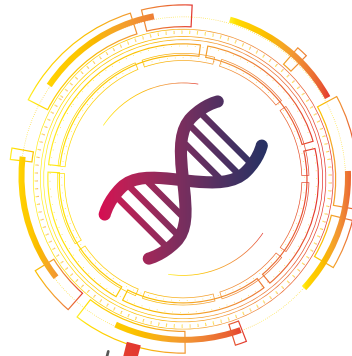


FOR A SURE WIN **INVEST IN ANDALUCÍA**

Andalusia
moving forward with Europe

invest **in**
Andalucía
SPAIN



BIOTECHNOLOGICAL SECTOR



EUROPEAN UNION
European Regional Development Fund



Junta de Andalucía

Consejería de Transformación Económica,
Industria, Conocimiento y Universidades

AGENCIA DE INNOVACIÓN Y DESARROLLO
DE ANDALUCÍA IDEA

INVEST IN ANDALUCÍA

1. ANDALUSIA, A COMPETITIVE SOCIETY.

AN INVESTMENT OPPORTUNITY

A REGION CONNECTED TO THE WORLD

ARTICLE BY THE GENERAL SECRETARY
FOR BUSINESS, INNOVATION AND
ENTREPRENEURSHIP

2. ANDALUSIA: TALENT + KNOWLEDGE + DECISION = LIVING STANDARDS

UNIVERSITIES

TECHNOLOGY PARKS AND CENTRES

3. ANDALUSIA, A COMMUNITY WITH INDUSTRY ENGRAINED IN ITS DNA

STRATEGIC SECTORS OF ANDALUSIAN
INDUSTRY

4. ANDALUSIA, AT THE BIOTECHNOLOGICAL CUTTING-EDGE

THE ANDALUSIAN BIOTECHNOLOGICAL
INDUSTRY, AN APPROXIMATION IN
FIGURES

MILESTONES OF ANDALUSIAN
BIOTECHNOLOGY

ARTICLE BY THE PRESIDENT OF ASEBIO

5. THE 'BIO-ANDALUSIAN' MODEL

ANDALUSIAN STRATEGY FOR CIRCULAR
BIO- ECONOMY

BIOTECHNOLOGICAL RESEARCH
INFRASTRUCTURES

6. SNAPSHOT OF THE ANDALUSIAN BIOTECHNOLOGICAL INDUSTRY

7. DIRECTORY OF CHEMICAL INDUSTRY COMPANIES IN ANDALUSIA

INVEST IN ANDALUCÍA

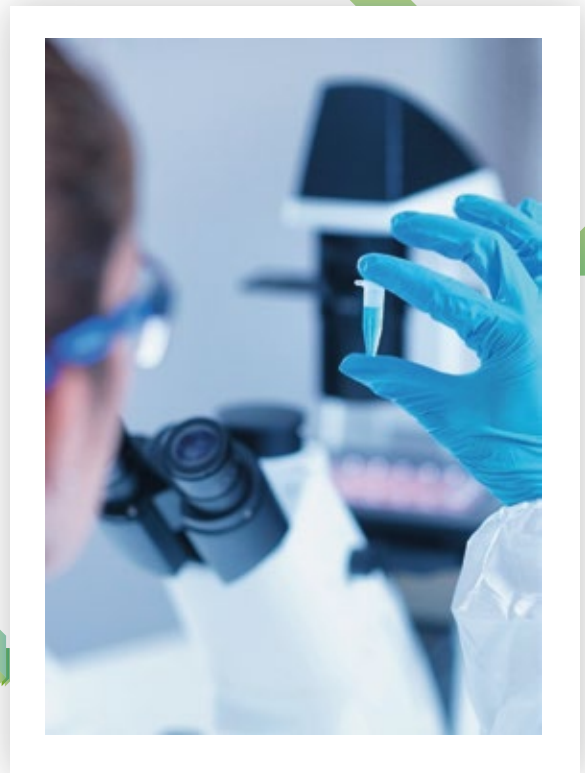
Biotechnology is a source of knowledge and techniques that, even today, marks the path towards progress in modern societies.

From research in this field, new treatments for serious diseases emerge, forms of farming that can alleviate food shortages in many areas of the world, clean energy sources as an alternative to fossil materials, production systems that reduce the ecological impact on nature and waste... Biotechnology provides answers, therefore, to many of the great challenges that humanity faces; answers with social and economic implications of the first order.

That is why, for two decades, Andalusia has fostered research and industry in the biotechnology sector in order to position itself at the forefront of this emerging revolution. And this has been achieved to the point of today becoming one of the main biotech powerhouses in Spain.

The biotechnology industry is a strategic sector in the Andalusian economy. The autonomous institutions have implemented policies aimed at promoting the development of the biotechnological ecosystem in the region through two key elements: the promotion of business activity and public-private collaboration both in research and in the industrial field.

In this context, the Invest in Andalucía project plays a relevant role, the initiative of the regional government managed by the Andalusian Innovation and Development Agency IDEA, which aims to promote, attract and bolster foreign investment in the region, with special attention to strategic economic sectors. Amongst them, biotechnology.



This programme facilitates collaboration between foreign investors and Andalusian companies to increase and develop their businesses within the region.

The IDEA Agency is equipped with a team of highly qualified professionals in its investment attraction unit. This unit's mission is to advise companies and offer tailor-made support in each of the investment implementation phases through an extensive portfolio of services.

Investor services

PLANNING PHASE

In this first phase, Invest in Andalucía provides information to the potential investor regarding sectorial regulations, the industry itself and markets. It advises on the search for a location for the project and facilitates meetings with potential partners, experts and business organisations. It also furnishes information on aid and financing sources on-hand.

IMPLEMENTATION AND SOFT-LANDING

In this second phase, the IDEA Agency professionals report on the workforce, employment costs, fiscal aspects, working and residency permits. Furthermore, it acts as liaison to establish contacts with other institutions and companies. Finally, they guide and monitor the administrative procedures necessary for the activity's start-up and help to identify locally based suppliers.

AFTERCARE

Invest in Andalucía's work does not end with the opening of the business, moreover it continues through the assessment of business development expansion plans.



Choose wisely, invest in Andalucía

Invest in Andalucía also includes the mission of making the strengths and enormous potential of Andalusian industry known abroad; a fact that often remains unknown and is overshadowed by the enormous powerhouse of the Andalusian branding linked to history, culture, folklore and its breath-taking landscapes.

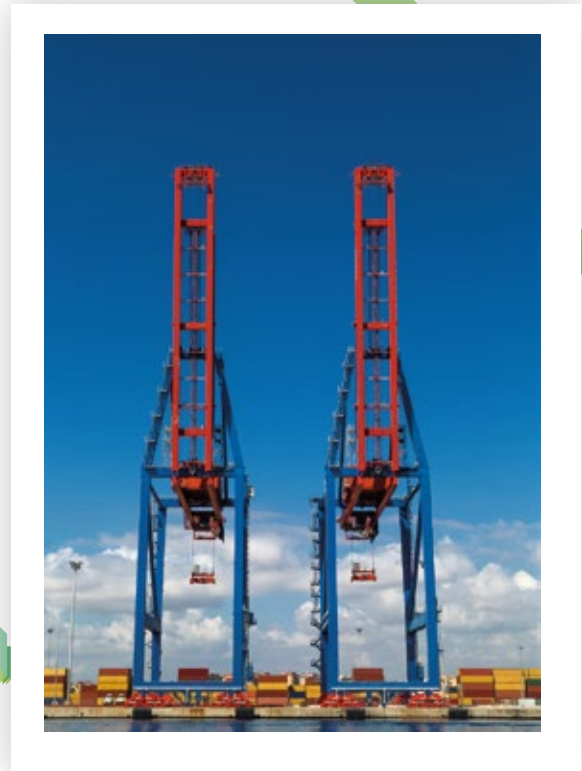
The Community has sturdy, innovative, competitive industrial sectors that look to the international market and that represent a sure-fire opportunity for international investors.

One of those sectors is biotechnology. This document offers an analytical overview of the multiple reasons that exist to invest in Andalusian industry and, particularly, in the local biotech industry.

Rationale linked to Andalusian talent, the ability to generate knowledge and technology from this dynamic and entrepreneurial society in southern Europe, the first-rate infrastructure and logistics networks in the region, the drive and innovation capacity of companies.

Against this backdrop...

**CHOOSE WISELY.
INVEST IN ANDALUCÍA.**





01

ANDALUSIA, A
COMPETITIVE SOCIETY. AN
INVESTMENT
OPPORTUNITY



Andalusia is a land with a history dating back millennia. It is a corner of southern Europe with endless beaches and a privileged climate. Andalusia features a mixed culture, a small homestead of universal artists. It combines monuments with nature, a place for the solace of travellers from all corners of the world. But Andalusia is so much more...

It is a land brimming over with future prospects whose inhabitants take centre stage in a tale of effort, progress and innovation that has one of its most brilliant chapters in the current drive to foster industry.

The region has been undergoing intense economic and social transformation in recent years, based on private initiative and which receives the impetus of the Public Sector Administration.

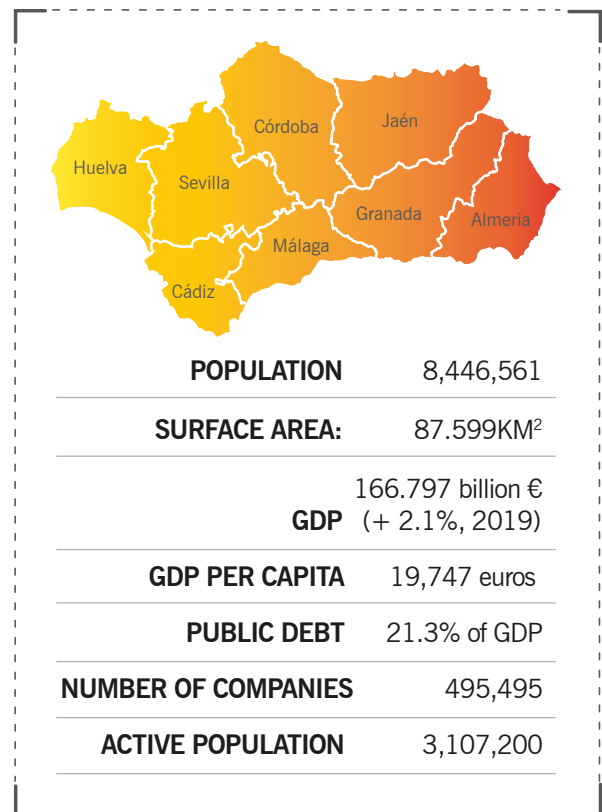
And it is here that international companies and investors enjoy the chance to develop their plans to, with Andalusian talent as an ally, advance in the global market.

Indeed, a significant number of large multinationals from different industrial sectors have already installed their production centres in the region: Atlantic Copper, Abbot, CEPSA, Bayer, REPSOL, Endesa, Heineken, Vida Farma, Acerinox, Cunext Copper, Naturgy, Valeo Iluminacion, Laboratorios Durbán, Danone, Renault, Airbus...

This is a land of opportunity. In fact, there are a thousand reasons to invest in it...

It is the most populated region in Spain and the second in the European Union. It is a market with enormous scope for potential due to the high number of prospective consumers.

Andalusia's population is higher than that of certain EU countries, such as Denmark (5,806,081), and similar to that of others, such as Austria (8,858,775).



ANDALUSIA IS ...

European leader in organic farming production

Third ranked Spanish region in the ICT sector ranking

First ranked in Spain in biomass electricity generation with biomass

First ranked national power in sales in the aeronautical sector

Largest European reserve of non-ferrous minerals

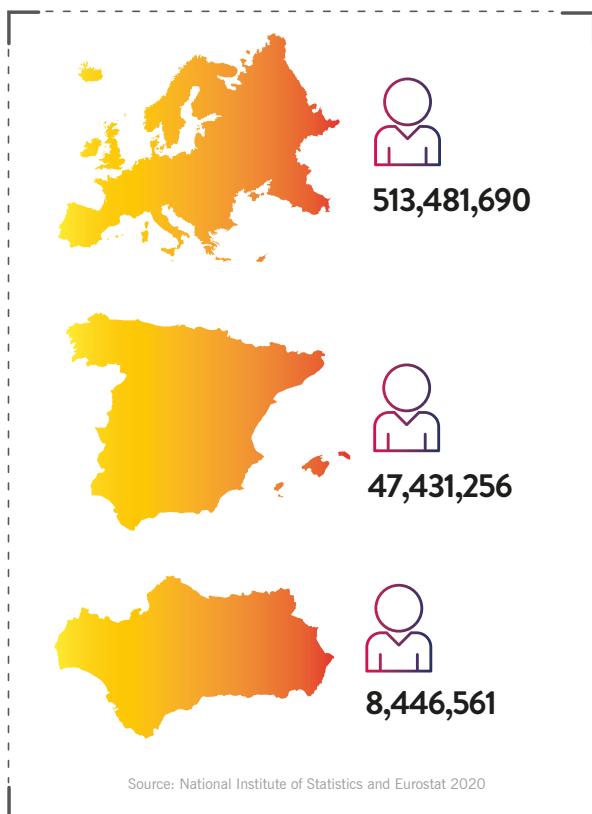
National leader in terms of energy production

Ranked second in Spain in oil refinery
In the top 3 Spanish of the biotechnology sector

The leading Spanish power in the transformation of non-ferrous metals

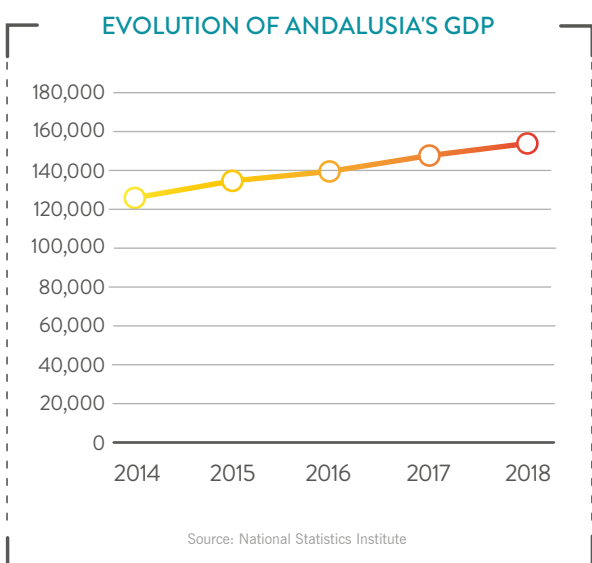
At the forefront nationally for cold generation within the metalworking industry.

Autonomous community featuring two of the main chemical poles in Spain

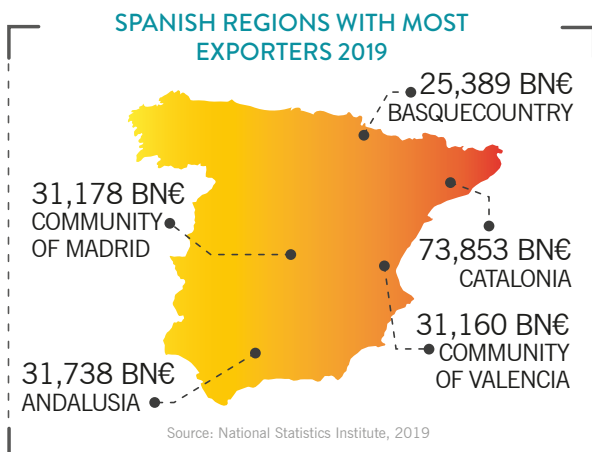


ANDALUSIA IS THE THIRD RANKED SPANISH ECONOMY IN TERMS OF GDP VOLUME

- Andalusia is the Autonomous Community with the largest active population (3,943,800), ahead of Catalonia and the Community of Madrid.
- It is, among the 17 Spanish autonomous communities, ranked third in terms of contributions to Gross Domestic Product in Spain. Its economic activity accounts for 13.4% of the country's wealth.
- Andalusia has been undergoing hitherto unseen uninterrupted economic growth since 2014. Its GDP has since increased by 2.4% on a year-on-year average.
- The high-tech manufacturing companies in the community have an annual turnover of 16 billion euros (Andalusian Agency of Knowledge, 2017). R&D&i is a key factor in the development of the region.



SECOND RANKED SPANISH COMMUNITY IN TERMS OF EXPORTS: 31.738 BILLION IN FOREIGN SALES



- Andalusia is the second ranked Spanish Community in terms of exports. The value of its sales abroad amounted to 31.738 BN euros in 2019, 6.808 BN€ more than in 2015.
- Andalusian foreign trade has a positive balance of 1.185 billion euros. This data contrasts with the dynamics of the country as a whole, which has a negative balance of 31.980 billion.

AT THE FORE NATIONWIDE EN FOR ENERGY PRODUCTION

25,500 Andalusian companies exported goods in 2019. 5,808 of these companies have sold abroad in at least the last four years.

Andalusia had a total of 495,495 companies in 2018, 15,165 more than in 2015.

EXPORT ACCOUNTS FOR 19.7% OF ANDALUSIAN GDP

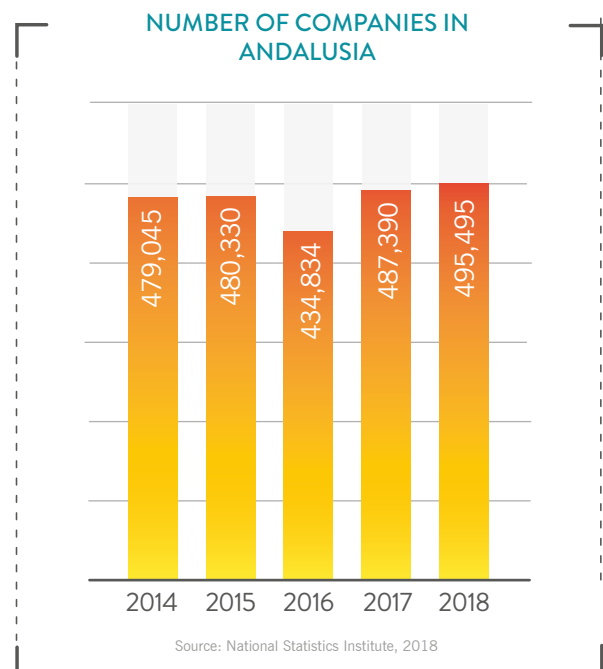
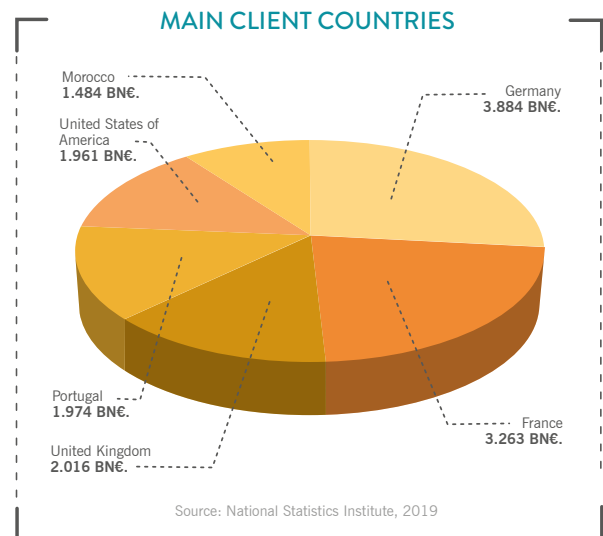
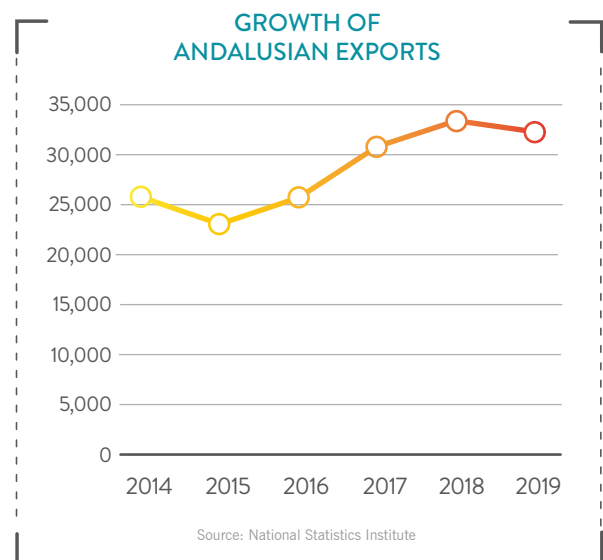
SECOND RANKED SPANISH COMMUNITY IN FOREIGN INVESTMENT GROWTH

Andalusia is the second ranked Spanish Community with regard to international investment growth rates. In 2019, Andalusia attracted 836 million euros in foreign investment, 82% more than in 2018. 30% of these investments were concentrated in the chemical industry and 24% in the financial services sector. The countries with the highest investment stakes in the region in 2019 were Thailand (30%), the United States (27.1%) and the United Kingdom (4.5%).

For its part, Andalusia invested 65 million euros internationally, 13% more than the previous year. Thus, the region has a favourable net capital receipt balance in 2019 of 771 million euros.

FIRST RANKED SPANISH REGION IN AERONAUTICAL INDUSTRY SALES

Andalusia occupies the third position in the ranking of the communities in terms of internal expenditure on R&D, with 1.479 billion euros. In fact, the Andalusian Community, Catalonia and the Community of Madrid account for almost 60% of total internal expenditure in Spain within this heading.



A TERRITORY CONNECTED TO THE WORLD

Between Europe and Africa, between the Mediterranean and the Atlantic, Andalusia gazes onto the world from its privileged geographical location, while its modern and extensive network of infrastructures facilitates international connection by land, sea and air. A determining factor not only for the Community to be a world power in tourism, but also for it to enter the industrial markets on a domestic and international scale.



AIRPORTS: Andalusia has five international airports (Malaga, Seville, Jerez, Almería and Granada) and one national (Córdoba).



PORTS: there are ten commercial ports in the region: Huelva, Seville, Malaga, Bahía de Algeciras, Cádiz, Bahía de Cádiz, Tarifa, Motril, Almería and Carboneras. Between all of them, they transported more than 160 million tons of merchandise in 2018.



ROADS: a network of 2,850 kilometres of expressways and motorways extends throughout the territory.



HIGH SPEED RAIL: Granada, Malaga, Cordoba and Seville are linked together by high-speed train and with the cities of Madrid and Barcelona.

COMPETITIVE ADVANTAGES OF ANDALUSIAN INDUSTRY

BY PABLO CORTÉS ACHEDAD, SECRETARY GENERAL DIRECTORATE FOR BUSINESS, INNOVATION AND ENTREPRENEURSHIP OF THE COUNCIL OF ECONOMIC TRANSFORMATION, INDUSTRY, KNOWLEDGE AND UNIVERSITIES.

Industry currently, in general, develops in a context of globalisation, which forces its companies to seek competitive advantages that allow them to gain in competitiveness, in a way that ensures their survival, while establishing the necessary conditions that will lead to new growth opportunities.



At the same time, it would be unwise to ignore the real threat posed to certain sectors of Andalusian industry by not taking far-reaching measures that reduce the gap of some of their companies, compared to other more streamlined and competitive ones, in a world where technology is increasingly decisive, it would be unfair not to acknowledge the role of reference of several of our industrial sectors, as a consequence of their multiple competitive advantages.

Closely linked to biotechnology, the agri-foodstuffs sector has managed to establish itself as a highly sturdy segment, thanks to its having incorporated innovation and digitisation throughout its food production and transport chain. The competitive advantage of incorporating innovation has been imposed by the exporter and perishable nature of its products, and the enormous demands of traceability control and, thanks to this, this sector has managed to introduce unique products in Europe, increase its business volume and to be able to comply with all established legal requirements. The large cooperatives of Huelva and Almería are worthy of special mention as success stories worldwide.

Another competitive advantage of the Andalusian industry is being able to count on the presence of large industrial tractors such as Airbus, in the aeronautical sector; Renault or Valeo, in the automotive sector; Navantia, in the naval; o CEPSA, in that of petrochemicals, whose requirements to be able to integrate into their production chains have been used by Andalusian SMEs as a means of specialising and increasing their competitiveness, while opening the way to new opportunities in the global market. This specialisation in the improvement of their production processes has also allowed other companies in industrial clusters, such as the marble mining in Almería, or the energy industry throughout the Andalusian territory, to acquire wide ranging competitive advantages compared to other companies worldwide.

Regarding the Andalusian biotechnology industry, the competitive advantage brought by innovation and international collaboration has resulted in a strong increase in investment, new products and the attraction of talent, as can be ascertained from the report 'AseBio 2019: Prepared for the Spain of tomorrow'¹ published by the Spanish Association of Biotechnology Companies.

Until the arrival of Covid-19, the outlook was positive in the creation of biotechnology companies. In 2019, the number of companies engaged in biotech activities stood at 2,969 in total (751 biotech). Of these biotechnology companies, 108 companies (14.4% of the total) are located in Andalusia, occupying the third pole of biotechnology activity in Spain, only behind Catalonia and Madrid, and followed by the Basque Country, where 70 of these are located Business.

According to the aforementioned AseBio report, the biotechnology sector competes in the global market and has chosen the majority to protect its innovations in the European environment with 214 patents, compared to the 79 patents applied for at the national level. The highest percentage of patents in the biotechnology sector were applied for at the European Patent Office with 42%, followed by 32% through PCT international patents and 15% who protected their patents at the Spanish Patent and Trademark Office.

Alongside being international in nature, the Andalusian biotechnology industry firmly backs collaboration. 68% of biotechnology alliances in 2019 were made with international firms. Furthermore, in 74 of the 155 alliances located, an entity from the public environment participated and regarding the objective of the collaboration, in 85 of these alliances they were to carry out R&D activities. This fact is compounded by the high research potential of the public and private R&D centres of the biotechnology sector existing in the community that compete and successfully at an international level, as well as the conditions and opportunities for collaboration that the space offered by the Granada Health Technology Park.

Therefore, there is no doubt that as long as the competitive advantages of Andalusian industry continue to be supported by these collaboration and innovation schemes, these advantages will be consolidated, and our industry will be able to continue growing and generating wealth and value in Andalusia and the rest of the world.

1. Report 'AseBio 2019: Prepared for the Spain of tomorrow' of the Spanish Association of Biotechnology Companies.
https://www.asebio.com/sites/default/files/2020-09/Informe%20AseBio2019_0.pdf



02

ANDALUSIA:
TALENT + KNOWLEDGE +
DECISION = LIVING STANDARDS



The Andalusian is a youthful society that enjoys the talent of its citizens as grounding for its growth. Its institutions have decided to back on the generation of knowledge as an engine of development. The foregoing, alongside a wide and excellent network of public services, makes Andalusia offer quality of life to those who wish to live and grow professionally in its territory.

Andalusia is a monument, it is history, a natural setting, a beach, a charming town, tradition, music... Yet it is also a region younger than the Spanish average (41.84 years compared to 44) in which more than 34,000 students graduate from its universities each year.

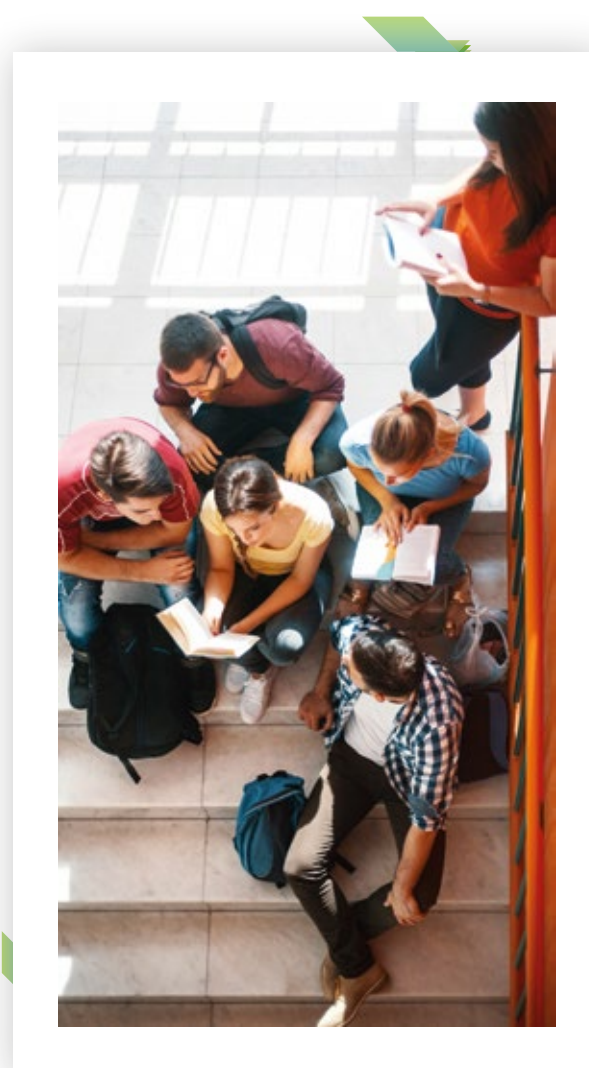
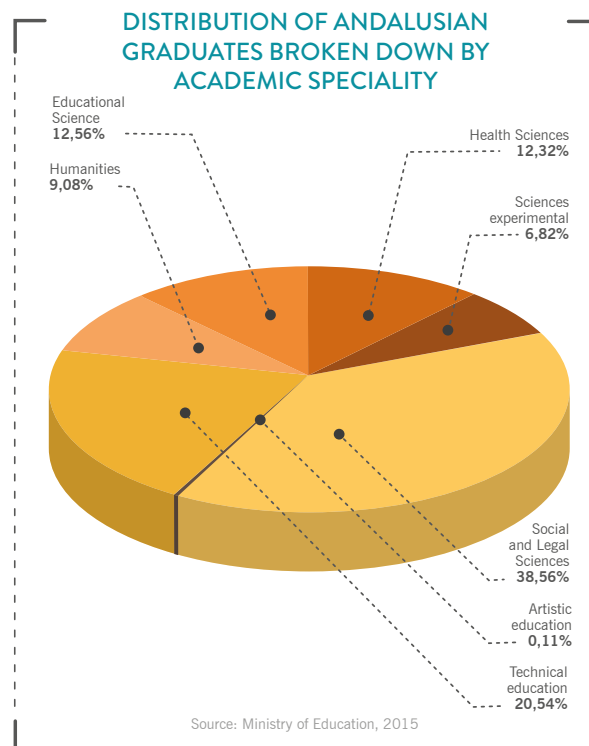
The decision to place talent and the generation of knowledge as bases for development is manifested in important public investments in the university and in the network of parks and technology centres that is spread throughout the region. Spaces, the latter, of cooperation between the Public Sector Administration, universities and the business fabric that are essential to foster knowledge transfer to the production system.

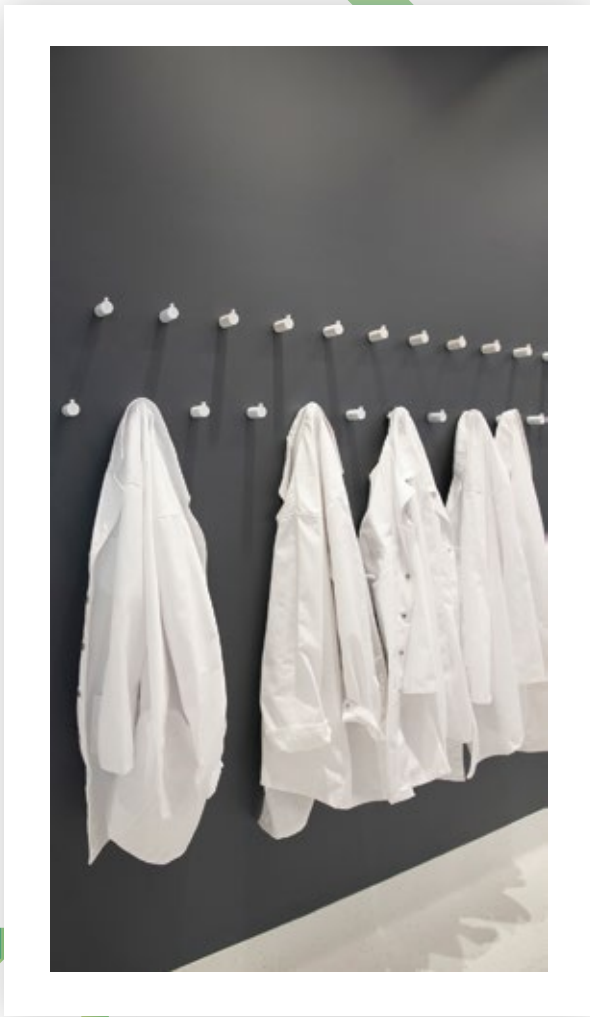
University

The university plays a key role in the region's knowledge production system, a key ally and with colossal potential for those who invest in its production system.

THE EIGHT ANDALUSIAN PROVINCES ARE THE SEAT OF AT LEAST ONE UNIVERSITY

In the territory there are 38 university campuses belonging to 11 universities, ten public (Almería, Cádiz, Huelva, Seville, Granada, Málaga, Jaén, Córdoba, Pablo de Olavide University, International University of Andalusia) and one private (Loyola University of Andalusia). Public universities offer 439 undergraduate degrees, 499 masters and 162 doctoral syllabuses in which 250,000 students enrol each year.





Almost 40% of graduates in Andalusia belong to the branches of study of Technical Teaching, Health Sciences, and Experimental Sciences.

Furthermore, universities comprise 86% of the 2,200 registered research groups in the Community.

Half of these 2,200 research groups carry out knowledge transfer to the business system.

Technology Parks and Centres

Andalusia also has a modern and extensive network of technology parks centres in which companies committed to innovation are based.

Technology parks:

These venues are innovation ecosystems from which regional strategies are promoted that foster knowledge transfer and technological innovation. They have business incubators and common infrastructure that facilitate cooperation between companies, which receive tax boost for relocating to them.

ANDALUSIAN TECHNOLOGY PARKS IN FIGURES



1,550
COMPANIES AND FIRMS

53,000
EMPLOYEES

321 M€
INVESTMENT IN R&D

6.701 M€
INVOICING

Source: Association of Technology Parks of Spain, 2018

- Scientific-Technological Park of Almería (PITA)
- Tecnobahía (Cádiz)
- Scientific and Technological Park of Cordoba (Rabanales 21)
- Scientific and Technological Park of Jaen (GEOLIT)
- PCTH Science and Technology Park (Huelva)
- PTS Healthcare Technology Park (Granada)
- Andalusia Technology Park PTA (Malaga)
- Aerospace Technology Park of Andalusia, Aerópolis (Seville)
- Cartuja Science and Technology Park (Seville)
- Soland Business Innovation Park (Seville)

Technology Centres:

ALMERIA

- Association of Harvesters Exporters of Horticultural Products of the Province of Almeria
- Experimental station at Las Palmerillas / Fundación Cajamar
- Fundación Mediterránea Company - University of Almeria
- TECNOVA Foundation
- Almeria Solar Platform - PSA

CADIZ

- Andalusian Centre for Wine-Growing Research
- Technological Skincare Centre-MOVEX
- Technological Agricultural Centre -CTAQUA
- Centre for Innovation in Advanced Manufacturing Technologies (CFA)

CORDOBA

- Foundation Centre for Agri-foodstuffs Research and Quality of Valle de los Pedroches

GRANADA

- R + D Free Software Foundation FIDESOL

HUELVA

- Agroindustry Technology Centre ADESVA

JAEN

- ANDALTEC Foundation
- Olive and Oil Technological Centre

- Ceramic Technology Centre - INNOVARCILLA

- Metalworking and Transport Technology Centre - CETEMET

MALAGA

- Andalusian Centre for Nanomedicine and Biotechnology

- Andalusia Tourism Innovation Centre - ANDALUCÍA LAB

- Railway Technologies Centre - CTF

SEVILLE

- Andalusian Industrial Research and Cooperation Association "F. by Paula Rojas"(AICIA)

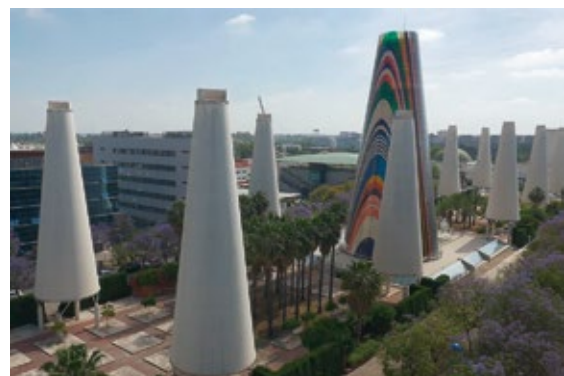
- Centre for New Water Technologies

- Andalusian Committee for Ecological Agriculture

- Technological Corporation of Andalusia

- Foundation for Research and Development of Information Technologies in Andalusia

- Advanced Centre for Aerospace Technologies - FADA-CATEC





03

ANDALUSIA, A COMMUNITY
WITH INDUSTRY ENGRAINED
IN ITS DNA



Andalusia has laid the foundations in its industry to take centre stage in the biotechnological revolution that will alter a large slice of the economic and social paradigms in force in recent decades.

The Community is the third bioregion in Spain in business volume, in number of companies and in investment in R&D. In the early years of the 21st century, spearheading genetic and stem cell research. This has resulted in the consolidation of a strong biotechnology industry in the healthcare field, which is the main exponent in the Granada Health Technology Park and in its companies.

The biotech business fabric is diversified and strengthened, especially in agri-food, which finds its powerful ally in the primary sector of the region, one of the most powerful in Europe.

Plus, it is that the biotechnology industry is for the autonomous government a strategic sector. As a consequence of this, the Andalusian Administration has undertaken a policy line aimed at promoting competitiveness, encouraging investment, promoting job creation, productivity and innovation in an increasingly diversified, strong and sustainable business fabric that means it is called upon to take centre-stage in the history of progress and overhaul that the Autonomous Community is experiencing.

Along with biotechnology, Andalusia has also pointed out the strategic importance of other sectors in which similar policies are adopted. Some of them connected with the tradition of the region, others purely disruptive, and which, as a whole, concentrate a large part of the modernising boost that is provided by the institutions.

These strategic sectors receive support from the public in the form of aid, subsidies, financing, infrastructures and advice for internationalisation and attracting investment. In this way, facilitating its development, Andalusia is aided as it forges along its path of progress.





Strategic Industrial Sectors

Chemistry.

Andalusia is the third ranked Autonomous Community within the national chemical industry. It has two large production centres: the Huelva and Campo de Gibraltar chemical centres, are national benchmarks in the chemical and heavy industry. The sector generates a business volume in the territory of more than 26 billion euros and has created direct employment for 27,000 people.



Information and Communications Technology.

The Andalusian ICT sector contributes around 2.3 billion euros to GDP and generates around 30,000 jobs. Furthermore, it is at the forefront in R & D & i with an internal expenditure in the region of almost 1 billion euros in innovation.



Metalworking.

Its importance is vital as an auxiliary industry of other fundamental sectors, such as aeronautics, automotive and renewable energy. Its impact in the region amounts to 75,000 jobs and more than 9,000 companies that have a joint business volume of around 10 billion euros.

Agribusiness and nutrition.

The industry with the deepest-rooted tradition in Andalusia. Its figures leave no doubt about its enormous economic impact: it has a business volume of 13 billion euros, boasts 7,000 companies and generates 52,000 direct employment posts. The region is the market leader in Spain in exporting fruits and vegetables and a leader in organic production.



Mining.

It is one of the engines of the community's economy, the first European reserve of non-ferrous minerals. The Andalusian mining business volume, with 6,800 direct jobs, exceeds 1.3 billion euros.

Aggregates, ornamental rock and industrial, energy and metal mining stand out.

Renewable energies and sustainable construction.

Andalusia is a trendsetter in solar thermal and wind energy and the first ranked Spanish Autonomous Community in biomass electricity generation. Sun, water and wind are abundant resources in the territory and allow us to support a commitment to the production of clean energy as an alternative to hydrocarbons. Andalusia is also promoting the transition towards a more environmentally friendly, more productive and more competitive construction model. These sectors, with more than 1,500 companies in the Community, generate 40,000 direct jobs.



Logistics.

The Andalusian logistics network covers an area of 1,800 hectares. Its eleven centres interconnected by land and sea represent a sizeable business opportunity for companies in this industrial field.

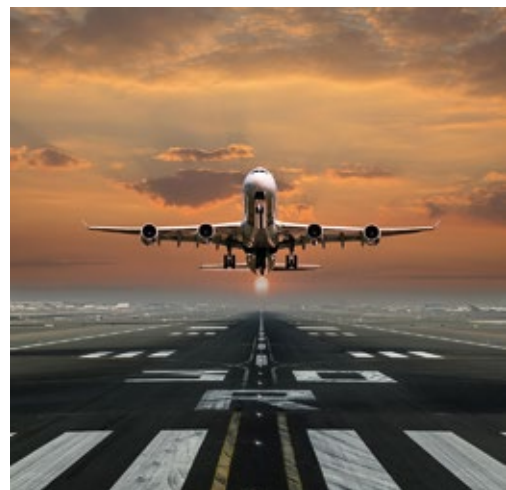


Tourism.

The tourism industry, with revenue figures of 20.5 billion euros, represents 13% of GDP for the region. The rich landscape, the historical and monumental legacy and the 2,800 hours of sunshine, attract 30 million visitors each year from the five continents who have the opportunity to enjoy a regulated accommodation offer of 546,000 beds.

Aerospace sector.

The aerospace sector enjoys more than a century's successful history in Andalusia. The manufacture and assembly of aircraft places Andalusia at the forefront of this industry in Spain. It generates a total business volume of 2,500 million euros and employs almost 16,000 people. The presence of AIRBUS in the region, with the final assembly of the A 400-M and programmes related to the A-320 and the A-350, invigorates a sector of enormous importance in the present and the future.





04

ANDALUSIA, AT THE
FOREFRONT OF THE
BIOTECHNOLOGICAL
REVOLUTION



"The next major revolution must be sought in Biotechnology"

Nicolás Negroponte, Founder of the MIT Media Lab

Andalusia is today one of the main Spanish powerhouses in the biotechnology industry. At a time, furthermore, in which advances in therein are taking place at a dizzying rate.

This fact leaves the region in a privileged place within an economic environment charged with the future, with enormous growth potential, the ability to generate added value and employment and with great influence on other productive sectors.

We are witnessing a period of inflection in which changes of innumerable paradigms are looming. And Andalusia is in a position to be at the forefront of this revolution, which is also industrial.

INVESTING IN BIOTECHNOLOGY IS TO INVEST IN THE SOLUTION TO THE CHALLENGES FACING HUMANITY

The continued development of Biotechnology in the territory for two decades has endowed Andalusia with the talent, knowledge and technology necessary to be at the forefront when it comes to helping to respond to the great generational challenges facing humanity in the 21st century and that mark the need for changes in the productive system: climate crisis, sustainable food production, protection of society against emerging diseases and increase in the life expectancy of the population. In order to solve these challenges, both the United Nations Sustainable Development Goals and the European Union's Green Deal pose the need for a new growth strategy that leads to a modern and competitive economy with greater respect for the environment and more efficient use of resources. Within this backdrop, Biotechnology will be key.



WHAT IS BIOTECHNOLOGY?

Biotechnology is any technological application that uses biological systems, living organisms, or derivatives thereof to make or modify products or processes for specific use

(UN Convention on Biological Diversity, 1992).

This can take the form of...

HEALTHCARE:

Applied to medical processes (human and animal health), both in the therapeutic field and in the diagnosis of diseases.

AGRI-FOODSTUFFS:

Applied to agricultural processes, food production or modification, improvement of the plants or animals from which the food comes or the development of microorganisms that intervene in the preparation of the same.

INDUSTRIAL:

Applied to the design of industrial processes and products that consume fewer resources than traditional ones, making them more energy efficient or less polluting.


SERVICES:

Biotechnology applications in other areas (technological services) and to support the development of the sector.

The Andalusian biotechnological industry, an approximation in figures

The analysis of the figures provided by the Spanish Association of Bio-Companies (ASEBIO), the leading business organisation in the sector at the national level, places Andalusia as the third Spanish bioregion, ahead of relevant industrial powers such as the Basque Country and the Autonomous Community of Valencia.

- More than **200 companies** are part of the **Andalusian biotechnological ecosystem. 108 of them are biotech**, that is, their main activity is Biotechnology research.
- Andalusia is the **third ranked Spanish Community in number of companies** within this industry.
- Andalusian biotech companies amassed a **turnover of 441 million euros in 2018**.
- Andalusian biotechnology generates **2,962 direct posts in the region**, of which 1,601 are occupied by researchers.
- In the territory there are **550 research groups** related to Biotechnology and belonging to both public and private institutions.
- Most Andalusian biotech companies undertake activities in health biotechnology (43%) and / or agri-foodstuffs (61%)**. 14% are employed in industrial biotechnology and 47% provide services.
- Andalusia **earmarks 185 million euros to R&D in Biotechnology**, more than 10% of national spending in this area.
- It is the **third ranked region in terms of investment in biotechnological innovation**.

-  The **biotech business fabric contributes 74 million in R&D**. Andalusia is the third ranked Spanish region in which companies invest the most in innovation..

Milestones of Andalusian biotechnology

The commitment of Andalusian institutions to Biotechnology, especially in the field of health, dates back to the dawn of the 21st century.

Since 2002, the region has been at the forefront of Europe in genetic and stem cell research thanks to pioneering legislation and significant investments in infrastructure and innovation.

The biotechnological grandeur in the Community has been reflected in these milestones amongst many others:


2002

-  Andalusia announces its support for research with stem cells for therapeutic purposes and a group of scientists will carry out work with stem cells in Seville.

2003

-  The autonomous Parliament approves the law that allows research with stem cells from cryopreserved embryos left over from in vitro fertilisation.
-  José López Barneo, Bernat Soria, Fernando Rodríguez Fonseca, José Becerra Rata and Enrique Guerado present the first four research projects with stem cells approved by the Regional Government of Andalusia, focused on neurodegenerative diseases, diabetes, the implantation of cell lines for transplants of organs and tissues and osteoarticular diseases.

2004

-  The Autonomous Commission of Ethics in Health Research comes into being, formed by 20 renowned professionals from different fields. This Commission is entrusted with

R & D IN BIOTECHNOLOGY PROVIDES SOLUTIONS IN ...

INDUSTRY

Development of alternative biofuels to fossil materials.

New solutions to reduce the emission of up to 2.5 billion tons of CO₂ per year by 2030.

The use of enzymes in laundry detergents saves 30% of electricity.

Biotechnology is an ally to cleanse the ocean of hydrocarbons and plastics.

HEALTH

New treatments for Hepatitis C that allow for 90% of cases to be cured.

Eradication of diseases like polio.

350 million people in the world benefit from biotechnological therapies.

69% of products in development and 72% of new treatments for rare diseases come from biotechnology.

Thanks to precision medicine, the response rate for cancer treatments reaches 30.6% compared to 4.9% for traditional treatments.

AGRICULTURE

Improvement of the living conditions of 17 million farmers and their families.

With biotechnological crops, the use of 15,240 hectares of land for agricultural production in Spain has been prevented in 20 years.

The Environmental Impact Quotient has been reduced by 18.4%.

Genetically modified foods to combat hunger and malnutrition such as golden rice.

The development of a multitude of functional ingredients that lead to a healthier diet.

(Source: Spanish Association of Bio-companies)



advising health authorities on issues of biomedical and biotechnological research.

- The Cell Lines Bank is inaugurated in Granada, which incorporates its own line of research into the Andalusian research project.
- The Andalusian Regional Government unveils, at the Pablo de Olavide University of Seville, the Embryo Research Laboratory on therapies applied to diabetes.
- The Andalusian Regional Government and Government of Spain sign the agreement through which the National Cell Lines Bank becomes the National Bank and central node for this research line.
- The Cell Therapy and Regenerative Medicine Laboratory is inaugurated in Seville, located in the Virgen del Rocío Ladies' Hospital.

2005

- The Andalusian Regional Government, the Higher Council for Scientific Research (CSIC) and the Hispalense and Pablo Olavide Universities of Seville, sign the agreement for the creation of the Andalusian Centre for Molecular Biology and Regenerative Medicine (CABIMER).

2006

- The Andalusian Centre for Molecular Biology and Regenerative Medicine (CABIMER) is inaugurated in Seville, one of the flagship centres in Europe in the field of stem cells and molecular biology and the largest of these characteristics at the national level.

2007

- The Andalusian Parliament passes the law that will regulate biomedical research in Andalusia using cell reprogramming techniques for therapeutic purposes, better known as therapeutic cloning.



- The Andalusian research group led by José López Barneo, Professor in Physiology at the University of Seville and Research Coordinator of the Virgen del Rocío Hospital in Seville, discovers the existence of stem cells in the peripheral nervous system, a finding that could open a new way of treating Parkinson's and other neurodegenerative diseases.

2008

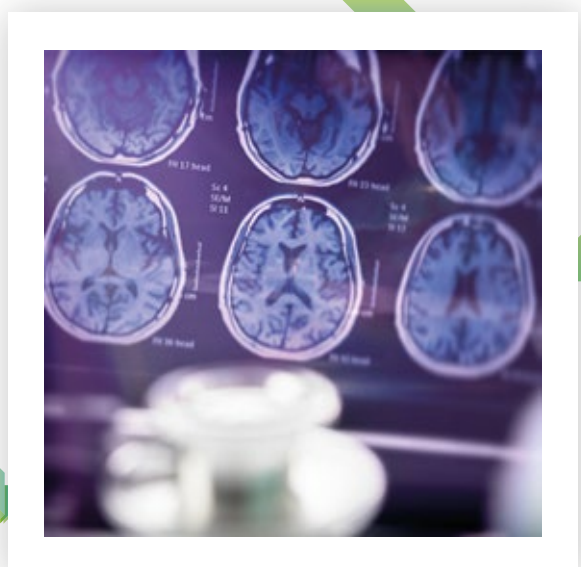
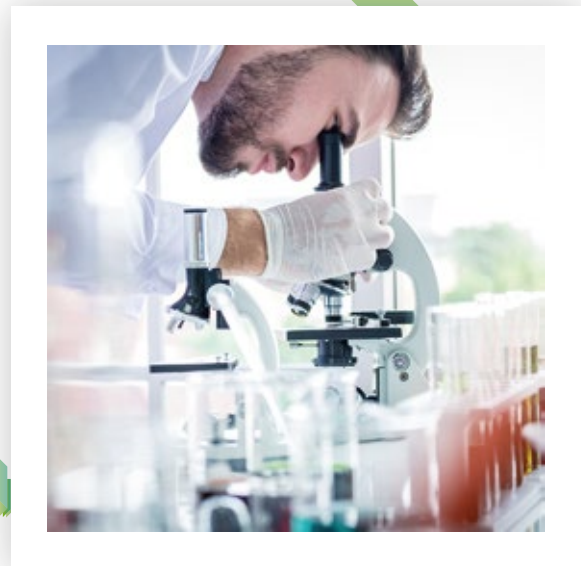
- The Virgen del Rocío Hospital in Seville discovers the largest gene in the human eye that causes the most common form of hereditary blindness. EYS (Eyes Shut) is the name chosen by the team of the director of the Genetics, Reproduction and Foetal Medicine Unit of the Seville centre, Guillermo Antiñolo, for the new gene.
- The Andalusian Government launches the Andalusian Initiative in Advanced Therapies (IATA), which seeks alliances between the academic world, research institutions, healthcare centres, patient associations, small and medium-sized biotechnology companies and the pharmaceutical industry to incorporate the advanced therapies as an element of innovation in health care and progress in the region.

2009

- A research group made up of professionals from the Virgen del Rocío Hospital in Seville and the Andalusian Centre for Molecular Biology and Regenerative Medicine (CABIMER) succeeds in deriving the fourth cell line of human embryonic origin in Andalusia.

2010

- Researchers from the Andalusian Stem Cell Bank successfully derive the first three reprogrammed cell lines in Andalusia, currently deposited in the National Cell Lines Bank, available to the research community for the study of miscellaneous pathologies.





- The Institute of Biomedicine of Seville is inaugurated, the fourth Andalusian centre specialising in biomedical research in which more than 500 professionals would work. It is located within the grounds of the Virgen del Rocío Hospital to unify basic and clinical research in the same physical space.
- The Andalusian Centre for Genomics and Oncology Research (GENYO) is inaugurated in Granada, an international benchmark in the study of genetically based diseases.
- Creation of the Andalusian Cell Reprogramming Laboratory (LARCEL) in collaboration with Michigan State University. Its mission: to promote research in regenerative medicine in Andalusia and knowledge interchange between the research staff of both institutions.

2011

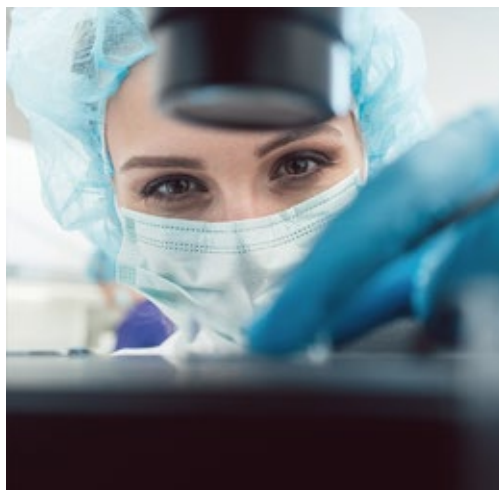
- The Andalusian Centre for Nanomedicine and Biotechnology (BIONAND), the first centre in Spain dedicated exclusively to the health application of Nanotechnology and Biotechnology, is inaugurated in the Andalusian Technology Park in Malaga.

2013

- Researchers from the CSIC in Cordoba create using biotechnological techniques, after decades of work, the 'tritordeum', a new variety of cereal fruit of the mixture of durum wheat and wild barley, which also has high contents of carotene, protein and fibre.
- Scientists from the University of Seville patent a technology to preserve organs complete at cryogenic temperatures.

2015

- Researchers Biomedicine (BIONAND) from the Andalusian Centre of and Biotechnology in Malaga and of the Superior Council of



Scientific Research (CSIC) show that it is possible to prevent the damage caused by ultraviolet rays to human epithelial cells by using sheets of a new material that is transparent to the human eye and opaque to carcinogenic radiation.

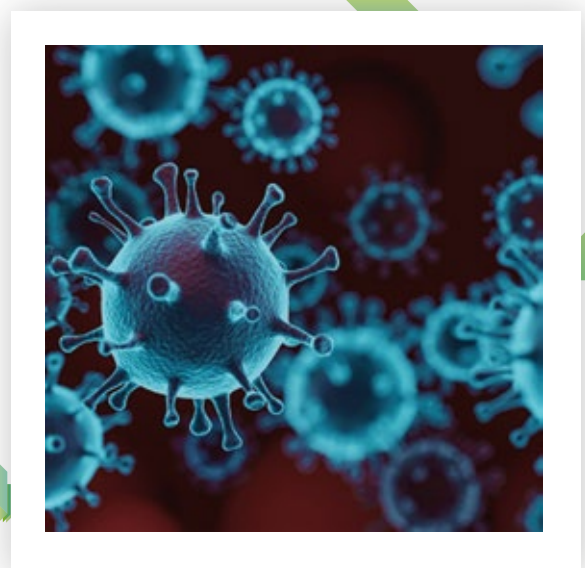
2016

- Scientists from GENYO, in Granada, develop a new method to treat cancer. The procedure consists of carrying out a blood test with which the cells causing the metastasis can be identified and the effectiveness of the treatments as they are applied can be ascertained.



2017

- Scientists from GENYO, a research centre located in the Granada Health Technology Park, take part in an international study aimed at drawing the world's first molecular map of autoimmune diseases.
- An investigation by the Virgen de las Nieves Hospital in Granada and the GENYO identifies, through liquid biopsy, the genetic expression of three biomarkers that affect the aggressiveness of prostate cancer. With this, the possibility of tailor-made treatments is promoted.
- The MEDINA Foundation Centre of Excellence in Innovative Medicines Research, at the PTS in Granada, houses the largest collection of microbial cultures for research in the world, thanks to a loan from the biopharmaceutical company MSD. With it, unexplored avenues are opened for the creation of new drugs and to avoid bacterial resistance to antibiotics.



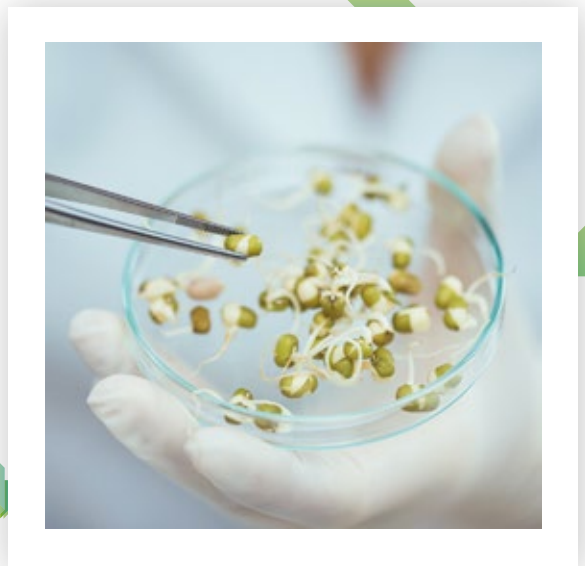
2018

- An international team of researchers led by scientists from the Andalusian Centre for Molecular Biology and Regenerative Medicine (CABIMER) have identified a molecule with therapeutic potential to reverse the autoimmune attack of the disease.
- Researchers from the Seville Institute of Biomedicine (IBIS) and the Hispalense University discover a new geometric shape in epithelial cells. The discovery of this form, which they call 'escutoid', goes around the world owing to the possibilities it opens up in the development of advanced therapies to cure cancer.
- The MEDINA Foundation becomes part of the new European network EU-OPENSREEN-ERIC, acknowledged by the European Commission as a European Research Infrastructure (ERIC). Belonging to this new research infrastructure places Andalusia in the reference networks in Europe in this field and facilitates the access of its research community to the main structures and applied research platforms for the discovery of new drugs and many other valuable biotech products.



2019

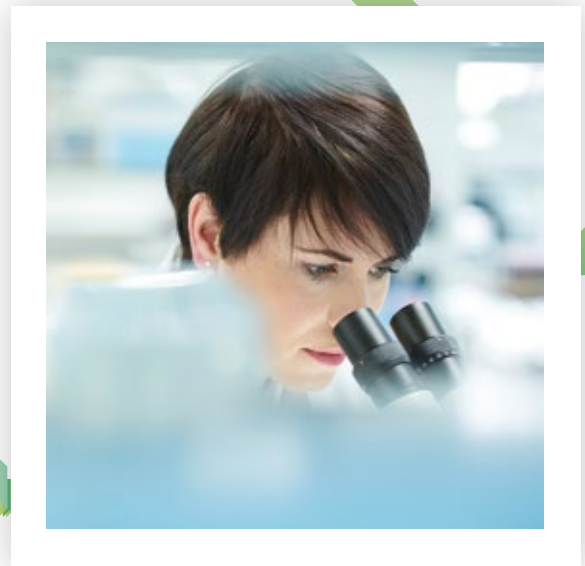
- The Almeria-based company Kimitec Group, specialising in the research and production of probiotics, bio-pesticides and bio-stimulants, is building in Almería the largest European centre for biotechnology applied to agriculture.
- A group of researchers from the University of Granada and the GENYO centre patent a new therapy based on smart nanoparticles to fight breast cancer.



- The Andalusian Network for the Design and Translation of Advanced Therapies (RAdytTA), of the Ministry of Health and Families, is born. An alternative to further advance in the design and translation of advanced therapies in Andalusia.

2020

- The Maternal-Foetal Medicine, Genetics and Reproduction Unit of the Virgen del Rocío Hospital accredits in Europe its capacity for the genetic diagnosis of 2,800 rare diseases. The centre uses massive sequencing for genetic diagnosis, being one of the centres with the highest performance in Spain recognised by the European Agency for Quality in Molecular Genetics.
- Andalusia begins the sequencing of the Covid-19 genome to ascertain its prognosis and response. The study, coordinated by the Bioinformatics Area of the Progreso y Salud Foundation, will sequence more than 1,000 coronavirus samples from 15 Andalusian hospitals.





WHY INVEST IN BIOTECHNOLOGY?

BY ANA POLANCO, PRESIDENT OF ASEBIO

Biotechnology is a sector that has continually proven its capacity for innovation and contribution to the economy of our country, as well as a growing international projection. The sector's commitment to science and innovation has allowed the generation of an economic impact of more than 8,200 million euros, 0.7% of GDP in 2018, a total impact of 105,060 top-notch jobs and significant income flows to the State, specifically, 3,616 million euros in total through the tax contributions of biotechnology companies to the State's coffers.

In recent months, furthermore, biotechnology has positioned itself as a strategic sector with a fundamental role in the reconstruction of the country due to its ability to identify the needs that could be key in an emergency situation and, above all, due to the potential it entails to offer useful tools to the National Health System should there be another pandemic.

During 2018 the biotech sector invested almost 770 million euros in R&D, of which 71% corresponds to biotech companies. According to these data, biotech companies ranked first as the industrial sector that invests the most in R&D, with an annual growth of 13% in 2018, ranking amongst the five sectors that grew the most in terms of R&D investment.

Financing and investor confidence

In 2019, a new record was set both in the number of operations (32) and in the volume of resources raised (103 million euros) by companies in the sector in private capital increases. Complementary financing in the form of loans and equity investments from business development bodies has increased compared to 2018. In addition, crowdfunding has established itself as a financing tool for the sector, reaching 10 million euros.

In 2019, the amount committed and paid out by venture capital management firms that have invested in Spanish biotechnology companies has also increased with more than 74 million euros.

Biotechnology in Andalusia

Over the last ten years, Andalusia has positioned itself among the first Communities in terms of the creation of biotechnology companies with 108 biotechnology companies, which places it in 3rd position in the national group (almost 15% of all companies in all of Spain). Its turnover corresponds to 4.47% of the total, occupying the 4th position and the average turnover is 4.4 million euros.

Andalusia was the first Autonomous Community to regulate research with stem cells of embryonic origin, through Law 7/2003 of October 20.

Regarding infrastructures oriented to biotechnological research, Andalusia is an advanced region that has fully backed the diversification of its research centres and that has, among other centres, with:

1. The Granada Health Technology Park (PTS) with a bio-incubator for companies.
2. The Cartuja Science and Technology Park. The scientific-business area is made up of technology and service companies, research centres and public bodies that endorse innovation and business associations. Furthermore, it boasts the "Technoincubator" for newly founded companies
3. The Andalusian Technology Park (PTA) located in Malaga for the generation and transfer of technology to the region.
4. The Science and Technology Park of Almería, PITA, an outstanding space related to green biotechnology associated with agriculture and food.

Challenges faced by the biotechnology sector in Andalusia

In Andalusia, it is necessary to continue attracting more investment, especially from business angels, facilitating knowledge of the sector and its potential as a generator of wealth. Biotech companies must also be supported in the outset so that they are able to create attractive business models for private investors.

It would be positive to expand public aid instruments, such as Challenges or guarantees, so that companies can obtain soft or mixed credit to reach a small business milestone, thus attracting more private investment.

Likewise, the technology transfer mechanisms from technology centres and universities should continue to be improved. In this sense, the OTRIS would be enriched with a greater connection with the world of private entrepreneurship, aware of private financing.

Advances in these challenges will allow Andalusia to continue occupying the top positions in terms of development and contribution of the sector to the country's economy as a whole.



05

THE BIO-ANDALUSIAN' MODEL



The biotechnology sector, given its strategic nature, receives support from Andalusian institutions in the form of tax perks, financing and infrastructure and spaces of excellence.

The Invest in Andalucía programme, through the IDEA Agency, facilitates collaboration between foreign investors and Andalusian companies to increase and develop their businesses in the region.

This role of the institutions is linked to the Andalusian Circular Bio-Economy Strategy, a model that reserves a leading role for biotech companies.

Investors in Andalusian biotechnology have the advantage of having as allies the specialist research hubs of the very highest international standard that exist in the region. In fact, some of the most innovative companies in the sector on the national scene have emerged from these scientific centres.

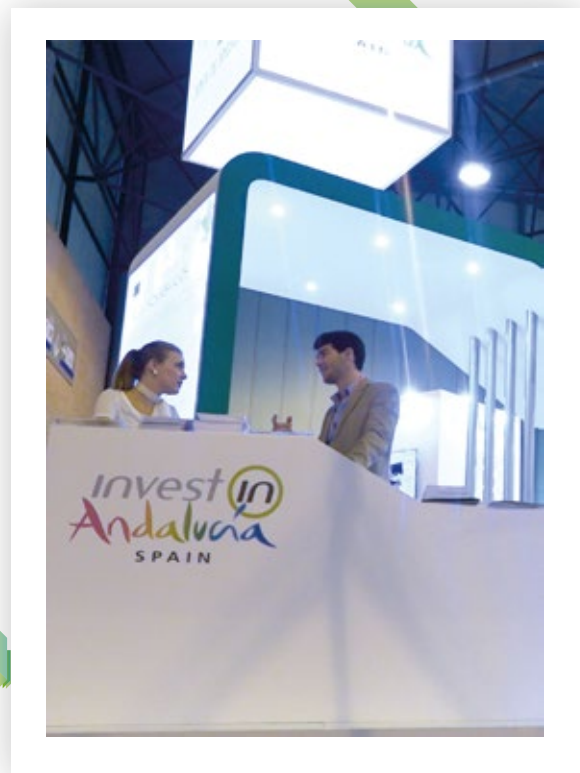
Andalusian Circular Bio-Economy Strategy

The Circular Bio-Economy is an economic model based on the production of renewable biological resources and their conversion, through physical, biological, chemical and biochemical transformations, into value-added bio-products, bioenergy and services.

It is a more efficient model in the use of resources that gives new utility, through technological innovation, to waste from other industries. Hence, its circular character.

It represents a response to environmental and social challenges, a way to guarantee the supply of clean and accessible energy and the fair distribution of food, to mitigate the effects of climate change by reducing the use of fossil materials.

And not only that. The Bio-Economy is an opportunity for economic development and quality employment.



In times of rapid change, we are witnessing a new, green and sustainable industrial revolution. However, the success of this process will largely depend on the biotechnological research, development and innovation capacity of economic stakeholders.

Andalusia is well positioned for this transition due to three factors. In the first place, owing to the large existing biomass production, from agriculture and agribusiness. Secondly, owing to the consolidated industrial fabric in chemistry, biotechnology and agri-foodstuffs. And finally, through the network of research centres in the region.

The Andalusian Circular Bio-Economy Strategy involves the adoption of a series of measures aimed at promoting activities related to this area. Amongst them, along with agriculture, forestry, fishing, food, chemistry and energy, biotechnological activity.

This strategy, which has a 2030 horizon and been endowed with resources worth 1.4 billion euros, rests on three fundamental aims:

1. **Increasing the sustainable generation of biomass resources** for their use through innovative processes.
2. **Encouraging the creation of bio-companies in Andalusia.**
3. **Increase the consumption of bio-products and bioenergy** amongst the population.

To achieve this, the Administration has devised four instrumental programmes:

- 1. Communication and awareness of Andalusian society regarding the Bio-economy.
- 2. Promotion of R&D&i in this area.
- 3. Financing to facilitate bio-economic development.



- Promotion of cooperation and coordination between the institutions, bodies and companies involved in this field.

Research infrastructures in biotechnology

Granada Health Technology Park (PTS)

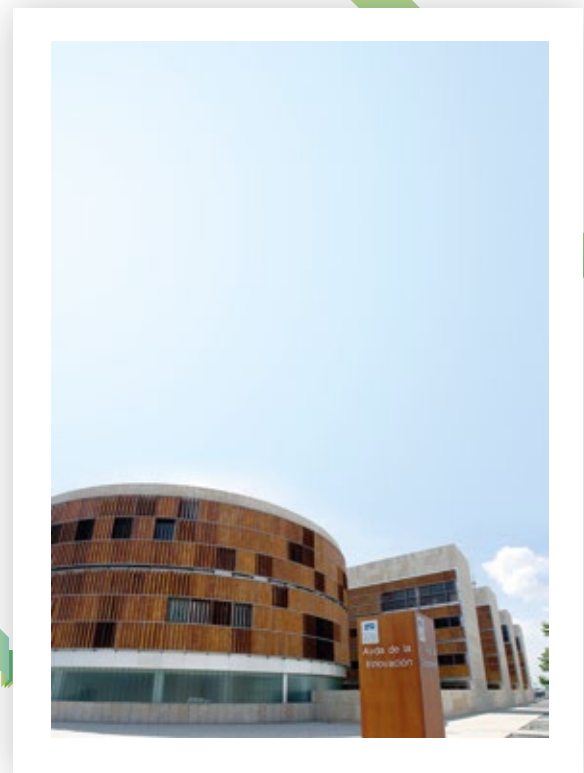
This space represents an international benchmark in Life Sciences and Health. It houses several faculties of the University of Granada, public health care centres, research centres of excellence and highly innovative companies in this field. All this implements a local ecosystem that places Granada at the first level of biotechnological innovation in Spain and throughout Europe.

Within the PTS, there is the Granada Business Innovation Centre (BIC Granada), managed by the IDEA Agency and funded by the European Union. Therein, the innovation-science-business system is fostered.

For this, it has a bio-incubator specialising in the creation and consolidation of technology-based companies, with special emphasis on those that were born as a spin-off of the University of Granada and that are linked to the life and health sciences.

Within the PTS ecosystem, the University of Granada itself, a prestigious institution in the fields Medicine, Biomedicine and Biochemistry, takes on special significance. The UGR participates in several of the PTS main research centres and houses the faculties of Medicine, Dentistry, Pharmacy and Health Sciences. This facilitates collaboration between companies and the research university itself.

Furthermore, the presence of the Hospital Campus de la Salud adds clinical experience to this virtuous circle of knowledge, innovation and industrial production.



Inside the Technological Park of the Health of Granada* are the laboratories of the Medina Foundation and the Pfizer-University of Granada-Andalusian Board of Genomics and Oncology Research (GENYO).

Fundación Medina is a non-profit research centre, created in 2008 through collaboration between the Regional Government of Andalusia, the University of Granada and the multinational Merck Sharp & Dohme Spain.

It specialises in the study of bioactive molecules, drug candidates and products of high biotechnological value to respond to medical and industrial needs not covered until now.

Fundación Medina is at the fore worldwide in the development of new drugs from natural products of microbial origin. It collaborates with the industry in the development of R&D in pharmacy, cosmetics, biotechnology and food.

GENYO is a mixed disciplinary centre participated by the Regional Government of Andalusia, the University of Granada and the global pharmaceutical company Pfizer. It is devised as a space for research of excellence on the genetic basis of diseases, including cancer, as well as on the influence of genetic inheritance in the response to certain drugs.

GENYO fosters multidisciplinary research with the participation of professionals from the health, university and business fields to generate new systems for the diagnosis, prevention and treatment of diseases based on the joint and coordinated application of knowledge in the different fields of genetics.

This centre participates in the Andalusian Research Programme in Clinical Genetics and Genomic Medicine, one of the three research programmes in Advanced Therapies of the Autonomous Community of Andalusia, together with the Research Programme in Cellular Therapy and Regenerative Medicine and Nanomedicine.



Also in the PTS of Granada is the Andalusian Bank of Stem Cells. Created in 2003, it is the first structure in Spain specifically dedicated to stem cell research. It is part of the Andalusian Programme for Cell Therapy and Regenerative Medicine and is the central node of the National Bank of Cell Lines through an agreement with the Carlos III Health Institute. It currently represents an international reference in terms of storage, management and quality control of this cellular material.

Science and Technology Park of Almería (PITA)

It is a space for green biotechnology associated with agri-food, an area in which the province of Almería is a European leader.

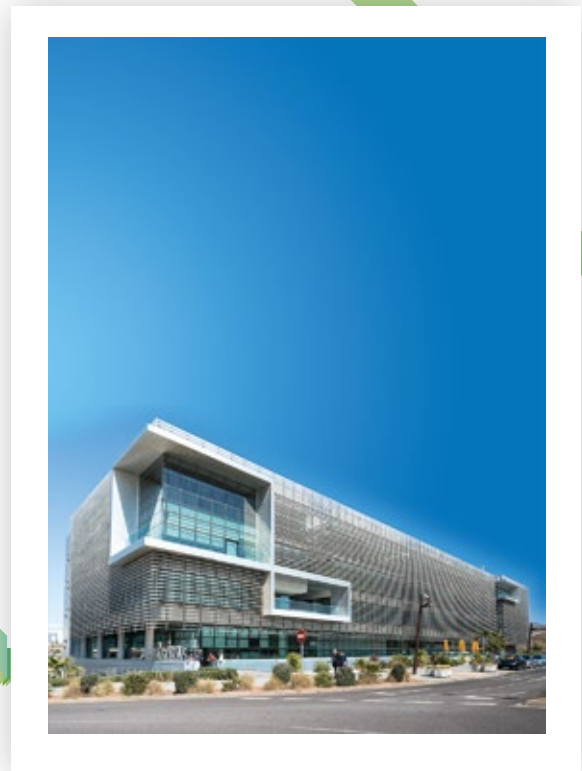
Through different programmes, it promotes the transfer of knowledge and technology generated by research centres and the university to the productive fabric, that the competitiveness of companies is increased.

It has two locations: one dedicated to companies, in El Alquián, and another of a scientific nature, in the University of Almería.

In its facilities there are a total of 75 companies with the common denominator of being highly innovative in their areas of specialisation. 15 of them engage in biotechnological activities.

Cartuja Science and Technology Park (Seville)

This is located on the grounds of the 1992 Universal Exposition and, therefore, integrated into the urban area of the city. It is another example of the drive carried out by Andalusian institutions towards local development and technological overhaul through public-private collaboration.



The figures accurately portray the importance of the Park. It houses 523 companies and professional bodies that generate 22,716 direct jobs. Its economic activity amounts to 2,902 million euros.

18 of these companies carry out activities related to Biotechnology.

The Park has a 'technoincubator' of companies through which, since 2010, the date of its creation, almost a hundred companies have passed.

The Andalusian Centre for Molecular Biology and Regenerative Medicine (CABIMER)

Installed in the Cartuja Science and Technology Park in Seville, it is a multidisciplinary research centre specialising in Biomedicine and a trendsetter in Spain. It integrates basic and applied research in order to translate the results of scientific work into direct improvements in the health and quality of life of citizens. From its 16 research groups, some of the most notable advances in recent years in this scientific field have emerged.

Andalusia Technology Park (PTA) of Malaga

Envisaged more than two decades ago for the generation and transfer of technology to the territory and mainly oriented to the ICT sector, it currently has 65 international firms installed.

Its contribution to employment and GDP in the province of Malaga, with a total of 639 companies and 20,270 jobs, amounts to 8%. Up to 1.6% compared to the whole of Andalusia.

Within the Malaga PTA is the BIONAND research centre.



Andalusian Centre for Nanomedicine and Biotechnology (BIONAND)

Both the Andalusian Regional Government and the University of Malaga hold in a stake in these publications. It is the first research centre in Spain exclusively oriented to research in nanotechnology applied to healthcare. It includes professionals from the healthcare, university and business fields to generate, through basic and applied research, new systems for the diagnosis, prevention and treatment of diseases based on the creation and development of devices, materials and approaches on a nanometric scale.

Institute of Biomedicine of Seville (IBIS)

Representing a benchmark centre in southern Europe in terms of biomedical research. It is housed inside the Virgen del Rocío University Hospital complex. Its aim is to carry out competitive molecular and cellular research on the causes of the most prevalent pathologies in the population and the development of new methods of diagnosis and treatment for them.

The Fat Institute (IG)

This is a centre dependent on the Higher Council for Scientific Research. It is based on the campus of the Pablo de Olavide University, in Seville. Its mission is to develop research aimed at characterising and obtaining quality, healthy and safe foodstuffs, as well as implementing new techniques in the agricultural sector that respect the environment. Its activity also provides evidence on the improvement of health, the prevention and treatment of diseases through the use of bioactive ingredients and plant and food components.

The Andalusian Agricultural and Fisheries Research and Training Institute (IFAPA)

It also has an area devoted to research and transfer of biotechnological techniques for the genetic improvement of plants and solving

SPAIN, NINTH RANKED WORLD POWER IN BIOTECHNOLOGICAL SCIENTIFIC PRODUCTION

With 10,934 articles on Biotechnology published between 2008 and 2018, Spanish Science is the ninth world power in the last decade in research on this matter.

It represents 3% of the total scientific production on this subject in the period. 83% of these articles were published in high-impact international magazines. 21% are also considered publications of excellence.

WORLD RANKING BY PUBLISHED BIOTECHNOLOGY RESEARCH ARTICLES, 2008-2018



1. **China:** 67,900
2. **USA:** 66,206
3. **India:** 32,349
4. **Japan:** 22,232
5. **Germany:** 20,704
6. **South Korea:** 19,924
7. **UK:** 16,178
8. **France:** 11,083
9. **Spain:** 10,934
10. **Canada:** 10,248

Source: ASEBIO 2019 Report

current problems faced in agricultural production. It embarks upon projects related to the cultivation of vines, legumes, strawberries, cereals and some crops with high market value, such as avocado and custard apple, amongst others.

RESEARCH AND INNOVATION IN HEALTHCARE IN ANDALUSIA

Andalusia has decidedly committed to the development of healthcare biotechnology, understanding it as an engine of scientific and industrial innovation and a decisive factor for the well-being of its population and of society in general.

This commitment is currently translated into a solid network of public research institutes and centres specialising in the area and which are a constant source of important advances. A good example of this is the **Maimonides Institute for Biomedical Research of Córdoba (IMIBIC)**, the **Institute of Biomedicine of Seville (IBIS)**, the **Institute for Biomedical Research of Malaga (IBIMA)** and the **Institute of Biosanitary Research of Granada (IBIG)**.

At the same time, thematic research centres have been developed within the framework of **the Andalusian Initiative in Advanced Therapies of the Regional Government of Andalusia**, aimed at creating and strengthening alliances between the university, research institutions, health centres, patient associations, small and medium-sized biotechnology companies and the pharmaceutical industry to incorporate advanced therapies as an element of innovation in health care and progress in the region. Within this initiative, the following are especially noteworthy.

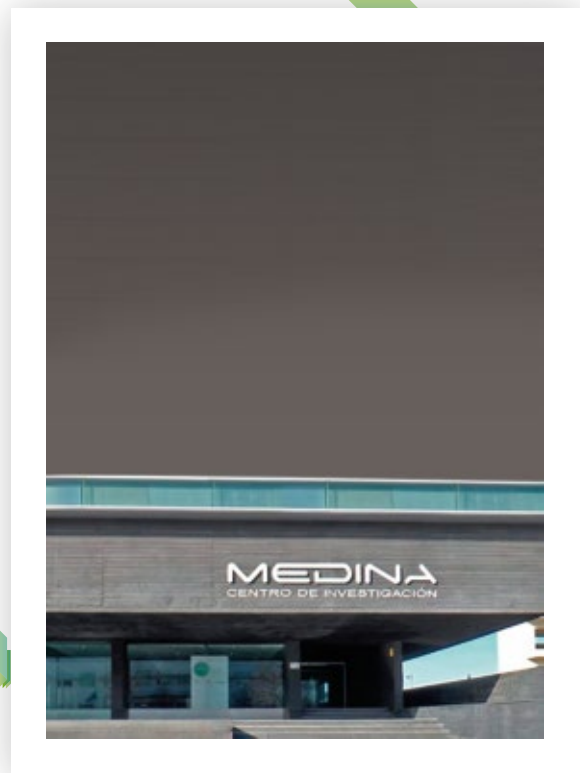
- **Andalusian Research Programme in Cell Therapy and Regenerative Medicine:** the Andalusian Centre for Molecular Biology and Regenerative Medicine (Cabimer) and the Cell Reprogramming Laboratory (LARCEL).



- **Andalusian Nanomedicine Programme:** the Andalusian Centre for Nanomedicine and Biotechnology (BIONAND) and the Centre of Excellence in Research on Innovative Medicines in Andalusia (MEDINA Foundation).
- **Andalusian Research Programme in Clinical Genetics and Genomic Medicine:** the Pfizer Centre-University of Granada-Andalusian Government of Genomics and Oncology Research (GENYO).

Continuing with the initiatives of the Andalusian Government to promote health biotechnology, the creation in recent times of new technological platforms, such as the **SSPA Biobank** that integrates, among others, the Cell Lines Bank and the DNA Bank, the Andalusian Genomics and Bioinformatics Platform (GBPA), and the **network of public GMP laboratories**, aimed at the manufacture of advanced therapy drugs with pharmaceutical standards deserve special praise.

The **Andalusian Public Progress and Health Foundation** also plays a pivotal role within this strategic area for Andalusia. Its mission is to facilitate activity and provide support and support to research centres and groups throughout the entire scientific process: from the development of the necessary resources (infrastructure, financing, development and mobility of talent), to the implementation progress and effective implementation of scientific production and the transfer of results to industry and society.





06

SNAPSHOT OF BIOTECHNOLOGICAL
INDUSTRIAL NETWORK
IN ANDALUSIA



Number of companies:

The **productive fabric** of the sector in the Community is **made up of some 200 companies**. Of these, **108 are biotech**; that is, and list research as their main activity.

The rest are auxiliary companies, users or list biotechnology as a secondary activity.

Andalusia is the third Spanish Community in number of biotech companies, ahead of major industrial powers such as the Community of Valencia and the Basque Country.

0.44 out of every 1,000 companies in the territory **are biotechnology**.

These 108 Andalusian companies represent **14.38% of the total number of Spanish companies** (751) that list Biotechnology as their main activity.

Invoicing

In 2018, Andalusian biotech companies had a **turnover of 441 million euros**.

Its activity contributes **0.9% of the regional GVA**.

Areas of activity

Most Andalusian biotech companies undertake activities in **health biotechnology (43%)** and / or **agri-foodstuffs (61%)**. 14% are employed in industrial biotechnology and 47% provide services.

Internal expenditure on R&D in biotechnology

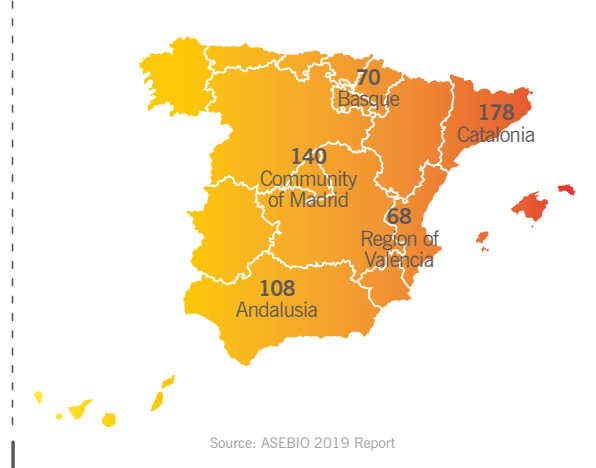
Andalusia invests **185.3 million euros in R&D in Biotechnology**, 10.4% of the total internal expenditure in Spain, which reaches 1.783 billion.

Andalusia is the **third ranked Autonomous Community in terms of investment in biotechnology research**, behind only Catalonia and the Community of Madrid.

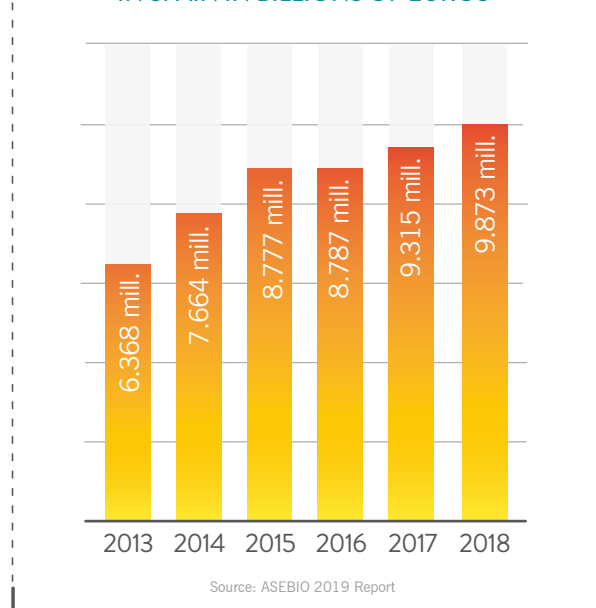
BIOTECH COMPANIES BROKEN DOWN BY AUTONOMOUS COMMUNITIES

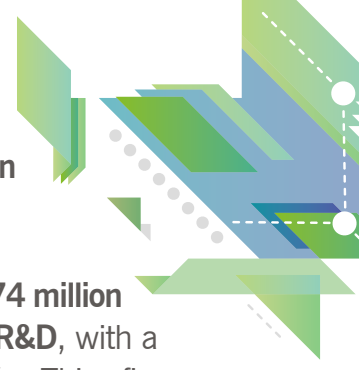


TOP 5 OF THE SPANISH COMMUNITIES WITH THE GREATEST NUMBER OF BIOTECH COMPANIES

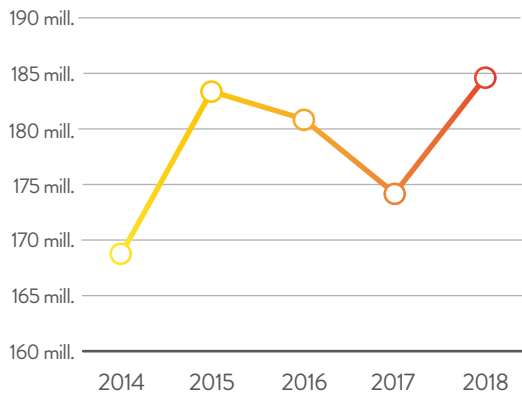


EVOLUTION OF BIOTECH INVOICING IN SPAIN IN BILLIONS OF EUROS





EVOLUTION IN ANDALUSIAN INTERNAL EXPENDITURE ON R&D IN BIOTECHNOLOGY



Source: National Statistics Institute

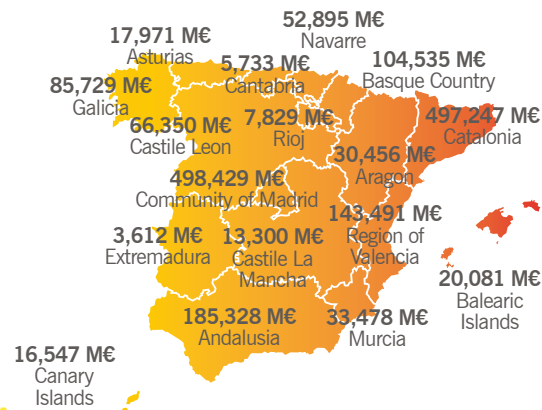
Internal expenditure on R&D in biotechnology

Andalusian companies invested **74 million euros** in **2018** in **biotechnology R&D**, with a year-on-year increase of 2.9%. This figure represents 9.6% of the total expenditure of Spanish companies (770 million) in this section, as reflected in the Survey on the use of Biotechnology of the National Institute of Statistics 2018.

Creation of new biotech companies

Andalusia has positioned itself in the last ten years amongst the top three Spanish regions in terms of the creation of biotechnology companies. In this time, a total of **109 companies** have come into being.

INTERNAL EXPENDITURE OF THE AUTONOMOUS COMMUNITIES ON R&D IN BIOTECHNOLOGY



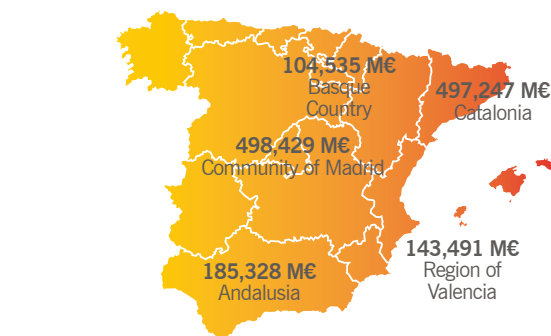
Source: NSI Survey on the use of Biotechnology, 2018

Employment

Biotechnology generated **2,972 direct jobs** in the Community in 2018, 3.2% more than in 2017.

Of these, 1,042 are filled by professionals recruited full-time by biotechnology companies.

COMMUNITIES WITH THE HIGHEST RATES OF INTERNAL EXPENDITURE ON BIOTECHNOLOGICAL R&D



Source: NSI Survey on the use of Biotechnology, 2018

The number of professionals engaged in research in the region is 1,601, of which 799 are women.

Andalusian biotechnology companies of reference

Andalusia has local companies that are especially intensive in innovation, especially in health biotechnology and food biotechnology, the two most cultivated areas in the Community.

Healthcare biotechnology

ADL BIONATUR SOLUTIONS: company founded in Cadiz that is listed on the Alternative Stock Market. It is a group formed by Bionaturis, Biobide, ADL Biopharma and Zip Solutions and that offers solutions in the field of healthcare, nutrition and cosmetics, amongst other activities.

BIOMEDAL: Seville-based company that was created from the city University in 2000 and that develops and markets laboratory services and analytical products for the control of food risks and the treatment of chronic diseases.

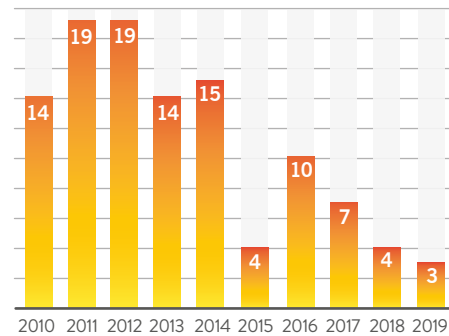
DNACTIVE: Andalusian company engaged in the analysis, diagnosis, prevention and treatment of sports medicine, genetics and nutrition.

INTEGROMICS: based in Granada, it is a spin-off of the National Centre for Biotechnology (CNB), the Higher Council for Scientific Research (CSIC) and the University of Malaga. It is defined as an engineering company applied to Life Sciences, whose purpose is the development of bioinformatics products and services for clients in the world of Life Sciences.

LIMNO PHARMA: created in Granada in 2019 in order to develop new therapies for various retinal diseases that affect more than 200 million people in the world and for whom there is currently no treatment available or treatments existing ones are very expensive and invasive. The diseases he initially addresses are age-related macular degeneration (AMD) and retinitis pigmentosa (RP).

REXGENERO: based in the Cartuja Science and Technology Park, in Seville, it stands out in the application of biotechnology and stem cell therapy for the treatment of diseases such as critical ischemia in the extremities and peripheral arterial disease, as well as other vascular and neurological pathologies.

CREATION OF BIOTECH COMPANIES IN ANDALUSIA



Fuente: Asociación Española de Bioempresas. 2019

ANDALUSIAN BIOTECH COMPANIES CREATED BETWEEN 2018 AND 2019

ACTUGC: company dedicated to the sequencing, analysis and research of nucleic acids (DNA and RNA). Use of artificial intelligence and databases for the bioinformatic analysis of the sequences.

AGROCELYS: production of seeds modified by CRISPR through the use of Big Data.

BIO KNOWLEDGE LAB: services to public and private research groups and R&D&I companies. Bioinformatics, molecular biology, image analysis services, etc.


BIOENERGIAS DE LA CAMPIÑA: marketing, management and distribution of fertilisers and other waste, as well as its treatment and recycling; and production of electrical energy.

DERMA INNOVATE: obtaining advanced compounds in the field of skin and hair regeneration.

LIMNO PHARMA: development of new therapies for age-related macular degeneration and retinitis pigmentosa.

VITANTECH BIOTECHNOLOGY: characterisation of biological risks and biosecurity of bacterial and fungal strains for the stable drying of bio-inoculants and biofertilisers and for the production of ecological bactericides and fungicides.

(Source: ASEBIO Report 2018 and 2019)



VIRCELL: is a biotechnology company based in the Granada Health Technology Park and specialising in the development and production of ready-to-use reagents in the diagnosis of infectious diseases in humans. It has a presence in laboratories in more than 80 countries over the five continents.

VIVACELL: based in Cordoba, it is a biopharmaceutical company specialising in the development of drugs derived from cannabis for the treatment of inflammatory and neurodegenerative diseases. Within this line, this company focuses its activity on the early stages of drug development. That research work is materialised in the form of patents.

VITRO: specialising in the development, manufacture and distribution of equipment, software and reagents for in vitro diagnostics, through the application of techniques based on non-invasive tests, such as immunohistochemistry and molecular biology techniques. It has production facilities in Seville (instruments and software) and in Granada (reagents).

Biotechnology in agri-foodstuffs

AGROCODE: belonging to the KIMITEC group and located in Roquetas de Mar (Almeria), its objective is to redefine the protection of crops against pests and diseases in crops through the use of bio-pesticides, without chemicals and producing food free of residues.

EUROSEMILLAS: Cordoba company that uses biotechnological R&D to obtain new varieties of seeds and in the application of technology in agriculture.

BIORIZON BIOTECH: its main activity, from the Almería Science and Technology Park (PITA), is the production of bio-fertilisers based on microalgae for agriculture. It also develops



bio-stimulants, based on antagonist microorganisms and safe pesticides, without residues, for an ecological and sustainable agriculture.

BIOSEARCH LIFE: is a biotechnology company of Granada origin focused on providing innovative solutions worldwide in the pharmaceutical, nutraceutical and functional food fields.

PEVESA BIOTECH: with facilities in El Viso del Alcor (Seville), it uses biotechnological techniques in working with proteins to obtain isolates, hydrolysates and amino acids.

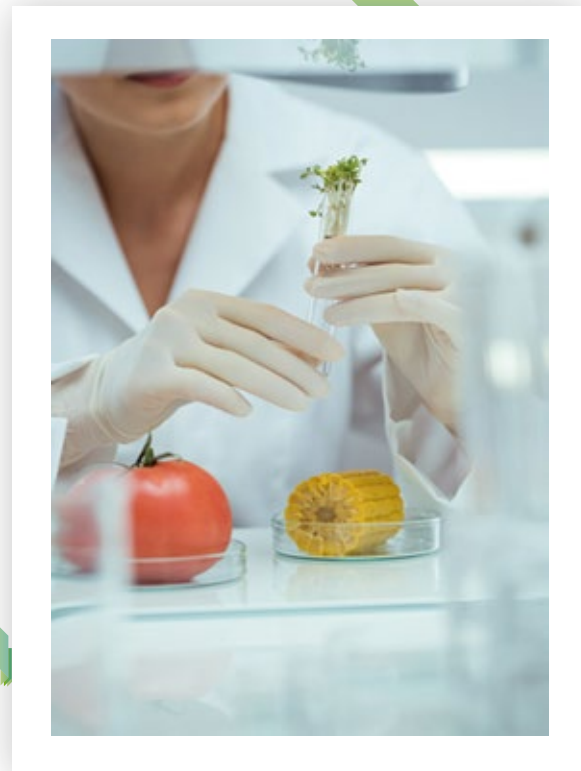
International companies in the sector with centres housed in Andalusia

Some of the major sectorial companies already have facilities in the Community:

ABBOT: is one of the world's leading specialist healthcare and research companies. Its portfolio includes specialist products in the area of diagnostics, medical devices, nutritional products and generic drugs. The Spanish subsidiary of the American giant has one of its headquarters in Granada.

BAYER: this international giant of the chemical-pharmaceutical sector has two working centres in Andalusia for its agrochemical subsidiary. One, in Brenes (Seville), dedicated to agricultural experimentation to research the behaviour into new molecules in Mediterranean climatic conditions. The other, in El Ejido (Almería), engaged in the production of new horticultural seeds.

CELGENE: global biopharmaceutical company that has one of its flagship centres in Europe in the Cartuja Science and Technology Park, in Seville. From this Celgene Institute of Translational Research Europe in Seville (CITRE), coordinates its research work in Europe.



MAIN MAGNITUDES OF THE SPANISH BIOTECHNOLOGICAL INDUSTRY

Provides 8.2 billion euros in income, 0.7% of the national industrial total.

Generation of 105,0600 direct, indirect and induced jobs

2,969 Spanish companies undertake biotechnological activities.


751 companies have their main activity in Biotechnology.

Of the Spanish biotech companies, 65% are SMEs.

Spain sets aside 1.753 billion euros to innovation in Biotechnology.

Spanish biotechnology companies allocate 770 million to R&D.

The R&D activity staff amounts to 27,551. Of these, 17,573 are employed by companies.



DUPONT PIONEER: this American multinational dedicated to the research and production of seeds has a centre for experimentation with new varieties of sunflower and corn in La Rinconada (Seville).

LABORATORIOS VIR: company created in Madrid in 1939 specialising in the manufacture of new drugs. The construction of a factory and an R&D centre in the Free Zone of the Port of Seville has been completed with an estimated investment of 20 million euros.

MSD (MERCK SHARP AND DOHME): is one of the world's leading companies in the manufacture of chemical, pharmaceutical and biotechnological products. It participates in the management of the Research Excellence Centre in Innovative Medicines in Andalusia-Medina Foundation, in Granada. It is a public-private research centre based in the Health Technology Park and established as a result of the alliance between the Regional Government of Andalusia, the University of Granada and Merck Sharp and Dohme Spain itself.

PFIZER: this American company founded in 1849, is currently a world leader among pharmaceutical laboratories. Within Andalusia, it has delegations in Seville and Malaga. It manages with the Regional Government of Andalusia and the University of Granada GENYO, a centre located in the Nasrid city and dedicated to research on the genetic basis of certain diseases, especially cancer, and the influence of genetic inheritance on the body's response to certain drugs.

ROVI PHARMACEUTICALS:

Chemical-pharmaceutical firm created in Madrid in 1946 specialising in the research, development and manufacture of medicines. It houses one of its production plants in Granada. It has announced the creation, in the Granada



municipality of Escúzar, of a plant for the manufacture of heparin, which will mean an investment for the company of 32 million euros and will promote the creation of 260 jobs. This project has been classified as of "strategic interest for the Community" by the Andalusian Government.

Launch of Andalusian biotechnology products and services in 2019

The Spanish Association of Bio-Companies (ASEBIO), the leading business organisation at the national level within this industry, points out the launch of 60 biotechnology products or services from companies associated with this body throughout 2019. Thirteen of these launches correspond to Andalusian companies:

AGROCODE BIOSCIENCE:

Priming technology. Formulations that improve the resistance of plants against adverse conditions.

BEST MEDICAL DIET:

Zero Allergen. Allergen-free food line.

BIOMEDAL:

GlutenDetect App. Gluten-free diet monitoring application.

BIOSEARCH:

Hereditum® IMMUNACTIV K8. Probiotic supplement that improves the immune response, protects against future infections and reduces the symptoms associated with respiratory infections in the elderly.

Hereditum® BfM26. Probiotic supplement for infant colic

Biosearch Eupoly-3® Algae. Natural source of omega-3 with high content of DHA, of non-animal origin, suitable for vegans.

Biosearch Voluntas®. Combination of extracts to support the healthy production of breast milk in those cases where there is a perception of insufficient milk production.

Optum Uncaria tomentosa extract optimally standardised and scientifically supported to be used as an immuno-stimulant.

TWO SUCCESS STORIES OF ANDALUSIAN COMPANIES AMONG FOREIGN INVESTORS

BIOMEDAL: The Californian company Hygiena touched down in Seville with the partial acquisition in 2018 of this Andalusian company, one of the most renowned companies in the region's biotechnology sector. After this operation, Hygiena takes the allergen detection tests that Biomedal has developed, as well as its test for the analysis of water quality. From this purchase, the American group will establish in Spain the company Hygiena Diagnóstica, based in Seville, which will continue with the development of innovative products.

PEVESA BIOTECH: The Kerry Group, Irish giant of dairy and meat and listed on the London and Dublin stock exchanges, is done in 2019 with the entirety of this Andalusian company, founded two decades ago in Seville and specialising in the manufacture of vegetable proteins for human consumption.

Exxentia® Kids. Formulas of standardised extracts free of ethanol for infant use.

Damilib®. Damiana extract standardised to 0.05% acacetin for sexual dysfunction in females related to decreased sexual desire.

Caronositol® Fertility. Mix of natural Inositols, indicated to improve fertility in women with Polycystic Ovarian Syndrome.

PEVESA:

OryzaPro V80. 80% rice protein concentrate with extrusion applications.





07

DIRECTORY OF CHEMICAL
INDUSTRY COMPANIES IN
ANDALUSIA



ADL BIONATUR SOLUTIONS, SA

Jerez de la Frontera (Cádiz)

www.bionaturis.com**AGQ LABS INTERNATIONAL, SL**

Sevilla

www.agq.com.es**AGROCELYS, SL**

Córdoba

www.agrocelys.es**AGROCODE BIOSCIENCE, SL**

Vícar (Almería)

www.agrocode.com**AGROINDUSTRIAL KIMITEC, SL**

Vícar (Almería)

www.kimitec.es**AL ANDALUS BIOPHARMA, SL**

Sevilla

ALCORA WATER RESEARCH CENTER, SL

Málaga

ALGA DEVELOPMENT ENGINEERING AND SERVICES, SL

El Puerto de Santa María (Cádiz)

www.algades.es**ALGATECH INNOVATION, SRL**

Almería

AMARNA THERAPEUTICS

Sevilla

www.amarnatherapeutics.com**APM INVESTIGACIÓN Y ANÁLISIS ALIMENTARIOS, SL**

Posadas (Córdoba)

www.amplab.es**AQUAVITALIDAD, SL**

Villamartín (Cádiz)

ANDALUCCELL, SL

Sevilla

ASESORÍA Y LABORATORIOS ALIMENTARIOS CORDOBESES, SL

Córdoba

www.alacor.es**AVANZA BIOTECHNOLOGY, SL**

Málaga

www.avanzabiotech.com**BAYER CROPSCIENCE**

El Ejido (Almería)

<https://www.cropsscience.bayer.es>**BEST MEDICAL DIET, SL**

Alcalá de Guadaíra (Sevilla)

www.bestmedicaldiet.es**BIOAVEDA, SL**

La Guardia de Jaén (Jaén)

www.bioaveda.com**BIOAZUL, SL**

Málaga

www.bioazul.com**BIOEASY, SL**

Málaga

BIOENERGÍAS DE LA CAMPIÑA, SL

Sevilla

BIOLIBERIS RESEARCH AND DEVELOPMENT, SL

Granada

www.bioliberis.com

BIOMEDAL, SL
Camas (Sevilla)
www.biomedal.com

BIORIZON BIOTECH, SL
Roquetas de Mar (Almería)
www.biorizon.es

BIOSEARCH, SA
Granada
www.biosearchlife.es

BIOTECH AGRICO, SL
Vícar (Almería)

BIOTECH CONSULTANTS
Marbella (Málaga)

BIOTECH SOLUTIONS INGENIERÍA, SL
Vícar (Almería)

BIOTECHNOLOGY RESEARCH LAB, SA
El Puerto de Santa María (Cádiz)

CAEBI BIOINFORMÁTICA, SL
Sevilla
www.caebi.es

CAMBRICO BIOTECH, SL
Sevilla
www.cambri.com

**CANNABIS BIOTECHNOLOGICAL
DEVELOPMENT, SL**
Vícar (Almería)
www.cbdagropharma.com

CANVAX BIOTECH, SL
Córdoba
www.canvaxbiotech.com

CELGENE RESEARCH, SL
Sevilla
www.celgene.es

**CENTRO DE ESTUDIO E
INVESTIGACIÓN DE LA FERTILIDAD, SL**
Granada
www.ceifer.com

**CENTRO DE INVESTIGACIÓN Y
SERVICIOS EN TEMÁTICA AMBIENTAL**
Jaén
www.cista.es

**CEPA NEMATODE PRODUCTION FOR
AQUACULTURE, SL**
Sevilla

CIFER CONTROL Y CALIDAD, SL
Granada
www.ceifer.es

CM MAS INVESTIGACIÓN, SL
Granada

CO2MO NO3, SL
Los Barrios (Cádiz)

CRYSTALGEL, SL
Granada

CULTIPLY, SL
Sevilla
www.cultipliy.es

CYCLO VITA, SL
Sevilla
www.cyclovita.es

DERMA INNOVATE, SL
Córdoba
www.dermainnovate.com

DESTINA GENÓMICA, SL
Armillá (Granada)
www.destinagenomics.com

DNActive
Granada
www.dnactive.es



DUNE GENETICS, SL

Benahavís (Málaga)

**DUPONTE INVESTIGACIÓN Y
DESARROLLO, SL**

Sevilla

DUPONT PIONNER

La Rinconada (Sevilla)

https://www.pioneer.com/web/site/spain/seed_production/

ECONATUR BIOSCIENCE, SL

La Carlota (Córdoba)

www.econatur.net

**EMERALD HEALTH BIOTECHNOLOGY
ESPAÑA, SL**

Córdoba

www.vivacellspain.com

**ENZA ZADEN CENTRO DE
INVESTIGACIÓN, SL**

El Ejido (Almería)

www.enzazaden.es

ETEREO QUANTUM SKINCARE, SL

Vález-Málaga

EUROGENETICS, SA

Córdoba

**EUROPEAN MEDICAL PLANNING
CENTER, SL**

Málaga

EUROSEMILLAS, SA

Córdoba

www.eurosemillas.com

EVITER STRATEGY EUROPE, SL

Torredonjimeno (Jaén)

EXPLOTACIÓN CÁÑAMO DEL SUR, SL

Jerez de la Frontera (Cádiz)

GENESTORE IBERIA, SL

Granada

GRUPO DE INGENIERÍA BIOMÉDICA, SL

Vélez Málaga (Málaga)

GUZMÁN BIOTECH, SL

Alhaurín de la Torre (Málaga)

www.guzmanbiotech.com

HEALTH MICROBIOTICS SPAIN, SL

Córdoba

HEFONA GROUP, SL

Dos Hermanas (Sevilla)

www.hefona.es

**HG BIOMEDICAL RESEARCH
DIAGNOSTIC, SL**

Aljaraque (Huelva)

www.hgcbiomedica.es

HISPAMED SERVICIOS BIOMÉDICOS, SL

Sevilla

www.hispamed.com

HM.CLAUSE IBERICA

La Mojonera (Almería)

<https://hmclause.com/es/>

HORIZONTE EFICIENTE, SL

Lucena (Córdoba)

HORUS LABS, SL

Almería

HYGIENA DIAGNÓSTICA ESPAÑA, SL

Camas (Sevilla)

www.higienda.com

INGENIATRICS TECNOLOGÍAS, SL

Camas (Sevilla)

www.ingeniatrix.com

**INGENIERÍA Y SISTEMAS DE ANÁLISIS
BIOMECÁNICO, SL**

Córdoba

INMUNOGENESIS ESPAÑA, SL

Sevilla

INNITIUS

Granada

<https://www.innitius.com>

**INSTITUTO BIOTECNOLÓGICO EN
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AVANZADAS P&C, SL**

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**INSTITUTO DE INVESTIGACIÓN
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www.invesbiofarm.com

**INSTITUTO INTERNACIONAL DE
FLEBOLOGÍA CABRERA, SL**

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**INSTITUTO INTERNACIONAL DE
GENÉTICA DE LA DIABETES, SL**

Sevilla

www.redgdps.org

**INVERSIONES INTERNACIONALES
CARMROD, SL**

Vélez-Málaga (Málaga)

ISQUAEMIA BIOTECH, SL

Córdoba

www.isquaemiabiotech.com

INTEGROMICS, SL

Armillá (Granada)

KIMITEC BIOGROUP, SL

Vícar (Almería)

www.kimitecgroup.com

KLOPPERT BIOLOGICAL SYSTEMS

La Mojonera (Almería)

<https://www.koppert.es>

LAP NATURE GROUP, SL

Huércal-Overa (Almería)

LIFEFOREVER BIOTECHNOLOGIC, SL

Gibraleón (Huelva)

www.lifeforever.site123.me

LIMNO PHARMA, SL

Peligros (Granada)

www.limnopharma.com

MICROGENESIS DIAGNOSIS, SL

La Rinconada (Sevilla)

www.microgenesis.net

MIRNAX BIOSENS, SL

Córdoba

www.mirnaxbiosens.com

NEART AND HEALTH, SL

Granada

3M STAFFIN AND CONSULTING, SL

Armillá (Granada)

www.3ml.es

ONCOBIOMED, SL

Aljaraque (Huelva)

PEVESA BIOTECH, SA

El Viso del Alcor (Sevilla)

www.pevesa.com

PHYTOPLANT RESEARCH

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www.phytoplant.es

PLUS VITECH, SL

Sevilla

www.plusvitech.com

PRONACERA THERAPEUTICS, SL

Olivares (Sevilla)

www.pronacera.com

QUESPER R&D, SL

Córdoba

www.quesper.es

REACTOMIX, SL

Granada



REGEMAT 3D

Granada

<https://www.regemat3d.com>**REKOM BIOTECH, SL**

La Zubia (Granada)

www.rekombiotech.com**RESBIOAGRO, SL**

Sevilla

www.resbioagro.es**REXGENERO BIOSCIENCES, SL**

Sevilla

www.rexgenero.com**RIJK ZWAAN**

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www.rijkszwaan.es**SANBIOTEC CONSULTING, SL**

Otura (Granada)

SEABERY SOLUCIONES, SL

Huelva

www.seabery.es**SENSOR4TEX, SL**

Granada

SIGMA BIOTECH, SL

Santa Fe (Granada)

www.sigmaboletines.es**SOCRYO, SL**

Sevilla

SUR STEVIA, SL

Palos de la Frontera (Huelva)

SYNGENTA

Sevilla / Almería

<https://www.syngenta.es>**TECNOPLANT TECNOLOGÍA E INVESTIGACIÓN AGRÍCOLA, SL**

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www.vitro.bio**VIVACELL BIOTECHNOLOGY ESPAÑA**

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www.xtrembiotech.com**YUKSEL SEMILLAS**

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