

# National Research Council Institute of Agricultural Biology and Biotechnology

## Our History

The Institute of Agricultural Biology and Biotechnology (CNR-IBBA) belongs to the Department of Biology, Agriculture and Food Sciences (DiSBA) of the National Research Council of Italy (CNR).

It was founded in 2001, following the merging of three CNR institutes: the Plant Biosynthetic Processes Institute (Milan), the Animal Germplasm Conservation Institute (Milan), and the Soil Microbiology Centre (Pisa).

IBBA has its headquarters in Milan and operating research facilities in Lodi, Pisa and Rome.

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## Our Research

Our activities are developed in the framework of **five research programs** which cover both basic and applied aspects in the areas of **plant and animal biology**, **agriculture** and **food science**.

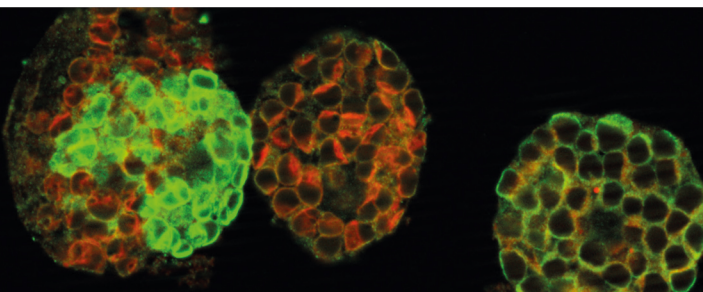
A major focus is on the quality and sustainability of agricultural products, the conservation and exploitation of biological resources, and biomolecule production.

We publish more than 50 research papers every year, and develop most of our work in collaboration with other public and private partners in Italy and abroad.

## Our Goals

The Institute carries out research, technology transfer and training activities in the areas of plant, animal and microbial biology in order to:

- **expand our knowledge of biological systems** at the molecular, cellular and whole organism levels, and characterize their interactions with the surrounding environment;
- **apply this knowledge** to the genetic improvement of plants, animals and microorganisms, and to biomolecule production;
- **develop new tools** for the nutritional and functional characterization of agricultural products, the identification of food pathogens, and food authentication;
- contribute to the **conservation** of biological resources.





## BIOCEL

### Cellular and developmental biology

Proteins are essential components of living organisms and one of the main constituents of human and livestock diets.

At IBBA we study **proteostasis and dynamics of eukaryotic cellular compartments**, in order to understand the mechanisms that allow the cell to maintain a functional proteome by balancing and integrating protein synthesis, modification, trafficking and degradation.

These studies are closely interlinked with our activities in the areas of **seed storage protein deposition** and of **protein expression in heterologous hosts**.

At IBBA we also study **plant development and animal reproduction**, with activities that target plant hormone function and the factors controlling fertility in livestock.

## BIOTEC

### Agricultural and industrial biotechnologies

Plant, animal and microbial cells are efficient factories for the production of a variety of biomolecules of interest for the food, animal feed, industrial and medical sectors.

At IBBA we work to improve our knowledge of these systems in order to **optimize the process of biomolecule production**.

Our research includes studies on the biosynthesis and accumulation of proteins and other molecules in plants and in cultured cells.

Biotechnological approaches are also used to make plant breeding strategies faster and more efficient, by taking advantage of recent breakthroughs that allow targeted modification of a genome.

These tools are now exploited in a variety of projects with the aim to improve the **quality and sustainability of agricultural production**.

## BIOGEN

### Genomics, epigenetics and biodiversity

The study of **plant and animal genomes** affords a unique opportunity to understand the genetic basis of adaptation to different environments, and to implement effective breeding programs.

IBBA is involved in national and international projects with the goals of characterization of **genetic and epigenetic variability** in plant and animal populations, and assembly of **high quality genome sequences** for major crop and livestock species.

IBBA is also actively engaged in **metagenomics studies** (from the plant rhizosphere to livestock and dairy animals) and is a partner of the BioGenRes initiative, which has the goal to characterize, curate and exploit the genetic databases managed by a network of CNR research institutes.

## PAINT

### Plant-environment interactions

Being sessile organisms, plants are unavoidably exposed to a plethora of stimuli generated by the surrounding environment, both of biotic and abiotic origin.

**Understanding how plants react to such stresses** is fundamental to select improved lines which can guarantee high and stable yields in a changing environment. Most of our current research in this area is focused on **hypoxia**, a widespread abiotic stress which is caused by adverse environmental conditions such as excessive rain and soil waterlogging. This type of stress is responsible for extensive crop losses worldwide.

At the same time at IBBA we are engaged in studies on **beneficial interactions**, such as the ones with endophytic and arbuscular mycorrhizal fungi, which can promote plant growth and productivity. Understanding the mechanisms of these interactions will help designing novel strategies to sustainably increase and stabilize crop yields.



## QUALY

### Quality, traceability and processing of agricultural products

The quality and security of agricultural production are fundamental for the whole food sector and animal feed chains. The characteristics of these products can be further improved by **optimized processing techniques** such as the ones studied at IBBA, leading to the production of **foods and animal feeds with enhanced nutritional properties**.

At IBBA we apply a wide range of methods to study the **quality and composition of agricultural products and processed food and animal feed**. We have also developed a novel methodology that allows monitoring the composition of complex matrices, with applications in food and feed traceability systems.

These activities are complemented by research addressing the **bio-functional properties of food products** and their potential **impact on human health**, with studies focused on the effects on gene expression, epigenetic changes, gut microbiota, and cell metabolism.